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LA FIN COURONNE LES ŒUVRES

John Yarker

NOTES ON

DARWINISM.

BY HÈYKIM NABI COSMOS.

"That which before us lies in daily life
Is the prime wisdom."
—MILTON: "Parad. Lost." B. VIII, c. 192.

"Facts are chiels that winna ding,
An' downa be disputed."

"His faith, perhaps, in some nice tenets might
Be wrong; his life, I'm sure, was in the right."

Man was never created shaven, and armed with a book on etiquette to guide him in polite society; nor yet could I believe Providence ever sent Man into the World ready booted and spurred to ride to the scaffold; nor yet, again, was Man sent into the World saddled and bridled to be ridden.

N. C.

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MDCCCLXXXI.

PREFACE.

Believing the proper study of mankind is Man, and thinking that I have a few jottings of note worthy memory, I launch them forth on the restless sea of man's opinion, according to the behests of the two gentlemen of Verona,—

> "When thou haply see'st
> Some rare noteworthy object in thy travels,
> Make me partaker of thy happiness."

I am aware that certain writings, like medicines, are not equally palatable to all. I therefore offer these notes to those who can appreciate them, the lovers of the pillar and ground of truth, but not to those assailants who would circumscribe our thoughts, or make us bend the knee to the shrine of cherished customs handed down from hoary antiquity, which are of equal value with the mythical story of Romulus and Remus. I am at variance with the

> "Slaves of custom and established mode,
> Who follow foolish precedents, and wink
> With both their eyes, is easier than to think."

I advise my readers to

> " Hold to the truth, define it well,
> For fear Divine philosophy should lead beyond the mark ;
> And be—
> Procuress to the Lords of Hell."

I shall now introduce my readers to Notes on Darwinism, with the remarks of "Nabi Efendi," a Turkish writer on Moral Philosophy :

> " Ignorance is the empoisoned source from which flows all the evils which afflict the World,—blind superstition, irreligion, and barbarism, destroyer of the Arts, march at its side ; shame, contempt, and vulgarity pursue its footsteps . . . . . Apply thy mind diligently to Philosophy."

HÈYKIM NABI COSMOS.

INTRODUCTION.

In these days of scientific research, grand generalizations have been reached. Darwin's theory of the origin of species is but one of the many: next follows one of momentous moment, the conservation of *energy, or force,* of which little is as yet known. The constancy and indestructibility of matter has long been known: this idea formerly applied to inorganic, but now it is applied to, or embraces, organic Nature. What is organic matter but the combination of a few gaseous elements, which is the breath of man. His animal life and muscular action are nothing more than molecular movement, his nervous system electrical currents, and his brain-power solar energy.

Darwin deals only with physical life, and yet many condemn his views: how much more will the public, then, stigmatise another branch of science far more mysterious and transcendental both in its actions and many modes of operation, that is, psychical life, which presents similar gradations and asks equally for a like solution. How are we to graduate the rungs of the ladder of the mind? Where are we to point out the border-land between Instinct and Reason? And what is the principle of the origin and growth of that mysterious power, which culminates in what we call Reason on our little planet. These, with man's destiny, are far more momentous questions, and they thrust themselves forcibly upon reflecting minds. As my object, however, is to enter into an examination of Darwin's theory, I shall make a digression accordingly.

DARWIN'S THEORY ON THE ORIGIN OF SPECIES.

MR. DARWIN having promulgated a remarkable theory on the "*Origin of Species by Natural*[a] *Selection,* or the preservation of favoured races in the struggle for life," which has created so intense an interest in the world at large; it is therefore now alluded to for comparison with other theories. He supposes that there exists in Nature powers acting slowly, but surely, capable of producing new species by gradual modification, and without the special exercise of any creative effort. Thus, for instance, in ages long past, there existed a fish which has been the common ancestor of the herring, sardine, sprat, &c., secondary cause, and not Divine Agency, having perfectly adapted each species to the precise position it fills in the union.

(a) Professor Agassiz [vide Tyndall's Belfast address, p. 45] said, regarding Natural Selection as promulgated by Darwin:—"I confess that I was not prepared to see this theory received as it has been by the best intellects of our time. Its success is greater than I could have thought possible." In 1813 Dr. Wells, the founder of our present theory of Dew, read before the Royal Society a paper, in which, to use the words of Mr. Darwin, he distinctly recognises the principle of Natural Selection: and this is the first recognition that has been indicated."

Again he says: "I believe that animals have descended from, at most, only four or five progenitors, and plants from an equal or lesser number. Analogy would lead me one step further—namely, to the belief that all animals and plants have descended from some one prototype. But analogy may be a deceitful guide. Nevertheless, all living things have much in common in their chemical composition, germinal vesicles, the cellular structure, and their laws of growth and reproduction. We see this in so trifling a circumstance as that the same poison often similarly affects plants and animals; or, that the poison secreted by the gall-fly produces monstrous growths on the wild rose or oak-tree. Therefore, I should infer from analogy that probably all the organic beings which have ever lived on this Earth have descended from some one primordial form, into which life was breathed by the Creator." In the struggle for life, and by the numerous variations which occur, less improved forms become extinct, and "thus, from the war of Nature, from famine and death, the most exalted object of which we are capable of conceiving, viz., the production of the higher animals, directly follows. There is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms, or into one; and that whilst this planet has gone cycling on, according to the fixed law of gravity, from so simple a beginning, endless forms, most beautiful and most wonderful, have been and are being evolved."

What is Darwinism? Some understand the question as Atheism—others as a harmless form of the doctrine of Evolution. It may, however, be considered as a theory of the Universe, at least, so far as the living organisms on this Earth are concerned. The question of questions for mankind is, What is the origin, nature, and destiny of man? Whence has come our race?

what are the limits of our power over Nature, and of Nature's power over us, to what goal are we tending? are the problems which present themselves with undiminished interest to every one born of woman. Mr. Darwin, by his theory, undertakes to give us satisfactory replies to each of these momentous questions.

In reviewing Darwin's theory of "Origin of Species" by *Natural Selection,*[b] I should be inclined to consider Sexual Selection as the dominant power in

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(b) Sexual Selection among Monkeys.—Mr. Darwin, in his "Descent of Man," holds that the brilliant coloring of the face in the male mandrill, and of the posterior callosities in that and sundry other species of monkeys, is the result of sexual selection. He now, in a communication to *Nature*, brings forward some new observations on this subject made by Joh. von Fischer, of Gotha. Von Fischer finds that not only the mandrill, but the drill and three other kinds of baboons which he names, also *Cynopithecus niger*, *Macacus rhesus*, and *M. nemestrinus*, turn the hind-parts of their bodies, which in all these species is more or less highly colored, toward him when they are pleased, and toward other persons as a kind of greeting. Many other facts of a like nature are mentioned by Mr. Darwin, and then he expresses the opinion that "the bright colors, whether on the face or hinder end, or, as in the mandrill, on both, serve as a sexual ornament and attraction. Anyhow," he continues, "as we now know that monkeys have the habit of turning their hinder ends toward other monkeys, it ceases to be at all surprising that it should have been this part of their bodies that has been more or less decorated. The fact that it is only the monkeys thus characterized which, as far as present known, act in this manner as a greeting toward other monkeys, renders it doubtful whether the habit was first acquired from some independent cause, and that afterward the parts in question were colored as a sexual ornament, or whether the coloring and habit of turning round were first acquired through variation and sexual selection, and that afterward the habit was retained as a sign of pleasure or as a greeting, through the principle of inherited association."

The Transmission of Habit.—A correspondent of *Nature*, resident in New Zealand, communicates to that journal several instances of the transmission of habits to offspring in animals. One instance is that of a mare which would wander away from the "mob" of horses to which she belonged—always seeking one particular creek. When released from work she would make off to her favorite feeding-ground by herself. One of her progeny, some years after, always separated in the same manner and remained for a certain hour in spite of efforts to remove it.

forming varieties. First—Males frequently contend for females, and the females yield themselves to the victor. In these battles, some particular advantage, either in strength or activity, or in more effective or offensive weapons, decides for the victor; there will be a tendency in the individuals of many species of animals to secure a preponderance of offspring from the strongest males. The peculiarities which gave the battle to the victor will, *cœteris paribus,* be transmitted to the male offspring, and in this way variations may be perpetuated, initiated, or intensified. Cunning, stratagem, &c., gained by animals whilst continually in company with man, will, by the same means, become hereditary[c] with future offsprings. In the case mentioned above, the selection is purely natural and passive. There are other cases where it is purely sexual, since its result is determined by spontaneous preference, and not by brute force alone. If the females of some of the lower animals have the power of expressing and exercising a preference in the manner above stated, then it is easy to understand how variations may be transmitted, or intensified. Color, song, odor, voice, &c., which decide the female's choice, will no doubt

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It is probably known to most of those who read these lines that one of the most satisfactory illustrations of the Darwinian theory of selection is that afforded by the species of which the horse, ass, zebra, quagga, sheep, and dog, are the modern representatives, and to which I shall refer hereafter.

(c) A singular instance of heredity is recorded in a note from M. Martinet to the Paris Academy of Sciences. In 1871 several chickens on a farm held by the author were affected with polydactylism, having a supernumerary claw. This had been transmitted to them by a five-clawed cock raised on the same farm a year or two before. The type was propagated rapidly until, in 1873, an epidemic ravaged the poultry-yard. At present, without any selection, this variety is very numerous; it has been propagated amongst neighboring farms through the exchange of eggs by the farmers; if nothing interrupts its progressive increase, it promises ere long to be predominant. The peculiarity was not so perfect at first as it is now; the modification has been going on progressively.

be transmitted to the offspring, and leave the largest number of descendants.

Animals and plants, being endowed with the germs to bring forth seed at all future time, whether as man, animal, or plant, and the reproducible part [d] of them, were really contained in the first germ—with man, the spermatozoa, or semen, contains *homununculæ,* or human beings in miniature, ready, with their vital properties, to be evolved, provided a suitable bed is prepared to receive and encourage their growth, in accordance with the Hindoo view, that man is the seed and woman the germ-bed. If the semen be not the excitant, then females would have germs.[e] The development of the plant, or of the animal, will be in proportion to the vitality and vigor of the seed, as well as the functional development of the female organs of generation, and their normal or abnormal condition, or, in other words, their suitable adaptation and healthiness to develop and bring forth a human being; and, in case they should be weak and unfructifying, the death of the seed would be the consequence, or, if matured to gestation, a weak puny child, or even a monster, or defective offspring, would be the result—which is usually called *"lusus naturæ,"* or freak of Nature. According to some writers, if the germ-bed, or mother,

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(d) Spermatozoa in man's semen is a species of the genus "cercaria" among the infusoria, and are rather flattish, with round head and long tail.

"Let a man consider, therefore, of what he is created. He is created of seed poured forth, issuing from the loins and breast bones." (KORAN, XXXVI).

(c) In some females germs cannot exist, for they are barren.

Mention is made, in "Land and Water," of a singular hybrid, the progeny of a barnyard cock and a common duck. The body of the hybrid is like that of a duck, but the feet, which have three front claws and a rudimentary back one, are not webbed, and the upper mandible is that of a fowl, extending only half the length of the lower, which is that of a duck, the singular formation causing great difficulty in feeding.

is weak, a female child will be the result; and, as a female brain is in size between that of a man and infant, it would be a very feasible view.

If we take up the question as to why the seed of any animal will not fructify when injected into the germ-bed of any other species, my answer will be that the constituents of the atoms of the semen are not only differently composed, but also differently arranged in position, quality, and quantity of each, as well as the fallopian tubes, ovaries, and uterus, or the whole female organs of generation, for they figuratively resemble a flower-bed, which is only prepared for special kinds of plants, and hence any other seed sown therein will perish; so it will be with the seed of animals, when planted in the germ-bed of different species. The semen of the dog, guinea-pig, rat, cat, camel, whale, &c., require different terms of gestation; and the period of gestation, again, is proportioned to the future development and longevity of the animal. The dog is as complex in its formation as the camel, yet the former is only of nine weeks gestation, the latter ten months, and the horse forty-two weeks.

It is here seen that the seed-bed, as with man, would require a modification both of the constituent parts, size, and temperature, to rapidly or slowly develope and eliminate different species of animals. Rapid growth in one case, with small brain development, is required; in others, as man, a slow growth is essential to a large and highly-developed brain: it is, therefore, clearly evident that human beings copulating with other animals could not be fruitful, if even sexual union was allowed; and we might just as soon expect to see a vine grafted on a thorn-bush bearing grapes, as that human beings can produce species different from themselves.

In referring to species, I may reasonably assert that all the germs of future plants, and organised bodies of all kinds, and the reproducible parts of them, are really contained in the first germ; species were not produced by independent creation, but that, under operation of a general law, the germs of organism produce new forms different from themselves when particular circumstances, invoke the law into action; and, finally, these invoking circumstances have occurred in definite order, and in conformity with a great [f] preordained plan, whereby the scheme of life has ever been kept in harmony with the ordinal rank which now prevails amongst plants [g] and animals.

In the production of some species, I think it is not a new individual, but a reproduction. It is an old species with revivifying properties. For instance, the germ of a lamb is extruded from the organisation of the sheep, the same as the bud is from the organisation of a plant, and its life is a continuation, and part of the same life animating an organism, the germ of which was in the parent. "The germ is thrown off, probably, from nerve-structure, which is the animal,—in fact, by a process of gemmation, as seen in lower

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(f) "All things have we created bound by a fixed degree."—(Al Koran, Cap liv.)

"In all the operations of Nature . . . God worked by law . . . by the process of slow development, by means, beautifully simple, involving no violence, no haste, yet irresistable."—Quarterly Review.

(g) Pliny, in the eighth book of his "History of Animals," when speaking of the chain of living things, says: "Nature passes so gradually from inanimate to animate things, that from their continuity the boundary between them is indistinct. The race of plants succeeds immediately that of inanimate objects, and these differ from each other in the proportion of life in which they participate; for, compared with minerals, plants appear to possess life, though, when compared with animals, they appear inanimate. The change from plants to animals is gradual: a person might question to which of these classes some marine objects belong."

organisations," and notably in vegetable life; the germ then so extruded is taken up by the blood and eliminated by a gland.

No point of time, and no condition, can be indicated as to when the future offspring is first lodged in the parent structure, unless by an act of creation: if so, it would require some interference in producing all germs.

The ascensive[h] development of the higher animals is more rapid than that of the lower, or, in other words, they pass through fewer stages into new species; and, in this case, the intermediate stages of man's ascent can scarcely be expected, and even these only within those regions which are now, or have been since the tertiary epoch, the head-quarters of the higher quadrumane.

Huxley says that Darwin has hampered himself by sticking to "*Natura non facit saltum.*" I greatly, however, suspect that it makes considerable leaps in way of variation, now and then, and these saltations give rise to gaps which exist in a series of known

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"The book of Nature! Shall not we chemists, and all our brother-students, whether they be naturalists, astronomers, mathematicians, geologists—shall we not all humbly and earnestly read it? Nature, the mother of us all, has inscribed her unfading, her eternal record on the canopy of the skies: she has put it all around us on the platform of the Earth! No man can tamper with it, no man can interpolate or falsify it for his own ends. She does not command us what to do, nor order us what to think. She only invites us to look around. For those who reject her she has in reserve no revenges, no social ostracism, no "index expurgatorius," no "auto-da-fe!" To those who, in purity of spirit, worship in her heaven-pavilioned temple, she offers her guidance to that cloudy shrine on which Truth sits enthroned, "dark with the excess of light!" Thither are repairing, not driven by tyranny, but of their own accord, increasing crowds from all countries of the Earth, conscious that, whatever their dissensions of opinion may heretofore have been, in her presence they will find intellectual concord and unity."—DR. DRAPER'S LECTURES.

(h) Animal life in the ascensive scale begins without nerve, and, in the highest unknown being, may have some other invisible force instead of nervous matter to move it.

forms. It may also be true, as some contend, "that Nature can produce a type without our being able to see the marks of transition, and that she can so alter a whole race simultaneously, without its passing through the phases of development, from an individual in whom the entire change was produced.

During the earlier stages of the Palæozoic age, the progressive development that took place advanced more [i] slowly than it did towards its close, and it is seen that, after entering the Mesozoic period, the rapidity with which that development increased becomes more and more marked as time advances.

The varieties of species into which humanity has fallen may, as many assert, have lapsed from the original Caucasian type. They may be descendants of man as God created him, but they do not represent, save in a hideous caricature, the glorious creature modelled of old.

Hunger and ignorance are the two degraders and

(i) "In periods of transition we can well imagine that an elasticity in stationary circumstances, usually all but dormant in an organism, comes into play with all its power; and hence that the type fit for the new conditions is, comparatively speaking, soon formed and fixed. We may thus understand how it is that a wide diversity among living forms has been brought about, and why it is that few fossils intermediate between them have been discovered."—(Dr. Draper's Lectures).

The native trees, bushes, and shrubs of Southern France that are most sensitive to cold during extreme winters are by Martins held to be survivors of the flora which covered the same area during the Middle Tertiary; they are exotic as to time, as other plants are exotic as to space.

Each of the geological periods has its dominating representative type of life. Perhaps it may be asked: "How can we be satisfied that the members of this long series are strictly the successive descendants by evolution from older forms, and in their turn the progenitors of the later? How do we know that they have not been introduced by sudden creations, and removed by sudden extinctions?" Simply for this reason: The new groups make their appearance while yet their predecessors are in full vigor. They come under an imperfect model which very gradually improves.

brutalisers of the human race. From the smallest monad up to man, sooner or later, they fulfil their destiny: in the words of the poet,

> "For every worm beneath the Moon
> Draws different threads, and, late and soon,
> Spins, toiling out his own cocoon."

It cannot be any more degrading to think man[j] descended from some antecedent inferior form of life than it can be an exaltation that man descended, or, in other words, was fashioned from the dust.

There is nothing disgusting or degrading in the connexion which Nature has established between all that lives. The jibing and jeering of an "ape-ancestry," so often resorted to by the ignorant and unscientific, has no significance to the mind of the philosophical naturalist.

Even if we believe there is a connecting link between man and some [k] ape-like animal, I have as

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(j) Oken asserts that man has been developed, not created. He conceived all Nature to be in a process of evolution.

Geoffroy St. Hilaire (1828) did not doubt that animals now living are descended, by an unbroken succession from extinct ones, by transformation from form to form; that different species are degenerations of the same type, being due to the influence of the environment "monde ambiente."

(k) The Berlin Gorilla.—At the recent meeting of the German Association of Naturalists, Dr. Hermes, as we are informed by "Nature," described some interesting characteristics of the young gorilla in the Berlin Aquarium. He nods and claps his hands to visitors; wakes up like a man and stretches himself. His keeper must always be beside him and eat with him; he eats what his keeper eats; they share dinner and supper; the keeper must remain by him till he goes to sleep, his sleep lasting eight hours. His easy life has increased his weight in a few months from thirty-one to thirty-seven pounds. For some weeks he had inflammation of the lungs, when his old friend Dr. Falkenstein was fetched, who treated him with quinine and Ems-water, which made him better. When Dr. Hermes left the gorilla on the previous Sunday, the latter showed the doctor his tongue, clapped his hands, and squeezed the hand of the doctor as an indication, the latter believed, of his recovery. For Pungu, as the gorilla is called, a large plate-glass palace has been erected in the aquarium in connection with the palm-house.

much right, or for the same reason, to believe it as to believe the second decade of Livy existed. Unless we understand how Nature, like the Sibyl, destroys her own books, we shall never cease to wonder how Nature disposes of her missing links. It is not one, but thousands of links we want;—where are the clay tablets of Chaldea-inscribed rocks, obelisks engraved, temple walls painted with hieroglyphics, as to expect to find every fossil of importance? Where are the missing links of the origin of man of literature, Sanscrit hymns written without ink on palm-leaves, with an iron pen?

Where are the lost Books of the Greeks and Romans? Where are the books destroyed in Alexandria, in time of Oumar, books destroyed by Popes and *Holy reverend Fathers of the Church*? Where are the books destroyed in Constantinople in the Crusaders time, Ctesia's Persia, complete works of Euclid, Works of Diodorus, Agatharcides, and Polybius, the twenty orations of Demosthenes, and "Odes of Sappho"? Fossils cannot be copied, once destroyed. Libraries of stone may now be burning under our feet.

Whether the descent of man from some as yet unknown ancestral race of anthropoid apes can ever be traced out, as the descent of the horse from the *Eohippus* has been, may be questioned. Yet, it is far too early to pronounce that the attempt must be useless.

(k) In accordance with man's descent, the cloacal structure exists in the earlier period of his embryonic life. The separation into two openings takes place about the 12th week of his uterine development. We, therefore, infer from the evidence of his embryonic forms, that he has been developed step by step out of the lower vertebrates.

About the middle of the Mesolithic period, out of a branch of the cloacal animals, the marsupials were evolved; and, in the beginning of the tertiary, the placentals were developed out of the marsupials.

N. C.

From time to time fresh evidence, filling up or reducing the gaps (rather wide) which still exist, may be expected to appear. Even now we have two very important discoveries—one showing that even among living men features of resemblance to the Simian races still exist, the other showing that we may fairly hope to discover many new races of fossil apes, and some of which may belong to that line of descent about which there has been so much dispute; the other that regions as yet unexplored may supply traces of the missing link between man and his simian kindred. It is known that certain peculiarities of the brain of man have been regarded as characteristics distinguishing it from the brain[1] of all other animals, and especially that of apes. Thus, in the brain of nearly every variety of the simian

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(1) The human encephalon undergoes considerable changes after birth, in its entire mass, in the proportions of its parts, and in the texture and consistency of its substance. The gradual evolution of the mental faculties corresponds to these alterations; which, indeed, accord with the slow development of the human frame in other respects. The Wenzels have afforded accurate information on some points. In an embryo of five months, they found a brain of 720 grains, cerebrum of 683, cerebellum of 37, which is a ratio of the former to the latter as $18\frac{17}{37}$ to 1: at eight months, the numbers were 4960, 4610, 350, or, as $13\frac{6}{35}$ to 1: at the time of birth, as 6150, 5700, 450, or $12\frac{2}{3}$ to 1: at three years, 15,240, 13,380, 1860, or $7\frac{6}{31}$ to 1: at five years, 20,250, 17,760, 2490, or $7\frac{11}{83}$ to 1. From fifteen to eighty-eight, the highest numbers occurred in a youth of the former age; they were 24,420, 21,720, 2700, or $8\frac{6}{135}$ to 1. Tab. 3. Soemmerring observes, in the explanation of his beautiful "tabula baseos encephali," p. 13, that the human brain has reached its full development at three years of age: the Wenzels affirm that this is not the case till seven, when, they observe, "Cerebrum hominis et quoad totum et quoad singulas partes absolutum esse videtur."—p. 247. "If the perfect state of the brain be considered to include the proportionate development of parts, the entire size and weight, the consistence and cohesion of the mass, and the state of vascular supply characterising the adult, we must fix as its era a much later period than the seventh year. I apprehend that the brain of animals will be found nearly perfect in

family, there is a certain inner convolution completely separating two fissures known as the internal perpendicular and the calcarine fissure. The only known exceptions are the *Ateles Paniscus,* a thumbless ape, according to Huxley, and the *Hylobates,* or long-armed gibbon, according to Bischoff. It has been somewhat too hastily taken for granted that this convolution has no existence, or is, at least, never fully developed, in the human brain.

It has frequently been asserted that the brain of apes (highest) differs from that of man's in the absence of such conspicuous structures as the posterior lobes of the cerebral hemisphere with the posterior cornu of the lateral ventricle, and the *hippocampus minor.* But

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its organisation at the time of birth ; and, consequently, that a comparison of man and animals in this point of view will disclose a remarkable point of distinction between them. The medullary striæ of the fourth ventricle are not seen at birth : their appearance in the first year, and that of the acervulus in the seventh, are regarded by the Wenzels as great peculiarities of the human brain, since that of the mammalia exhibits no such development of new parts after birth. Cap. 27. This seems to me a confined and inadequate view of a point which, in its full extent, is of great importance."

Cephalization is shown both in embryonic development and in the progress of life in geological history. The law is further illustrated by the discoveries of Prof. Marsh, from which it appears that the brains of the great mammals of the early Tertiary were very much smaller than those of allied species of recent time. Thus the brain of the Dinoceras of the Eocene was not more than one-eighth the size of that of the modern Rhinoceros, showing an immense development of the brain, while the bulk of the animals has decreased. We have also a development of those features of both form and capacity which are characteristic of brain-power.

The increase of the brain and nervous system may arise, the author suggests, from the fact that this part of the structure comes in contact with outside and inside Nature, and is the means by which the animal has communication with the outer and inner world, and with its own inner workings and appetites. This constant and energetic use of the brain may have given to it its wonderful growth and strength since Eocene times.

But brain-progress could not have taken place without structural progress, and structural changes have been determined by it. Brain-force re-acts upon and modifies both form and structure.

it is a well known fact that the three structures are not only well developed in apes, but also in all primates (Lemur excepted). Every principal sulcus and gyrus of a chimpanzee's brain is represented in that of man. A most exact anatomical investigation is needed to distinguish the differences. The lobes of the brain of a new-born babe hold just the mean between those of a chimpanzee and that of an adult man. Professor Bischoff says the differences in brain formation of man, the orang, the chimpanzee and the gorilla come very close to one another. The orang and chimpanzee have two *corpora caude cantia*, &c., while the lower ape (*cynomorpha*) has but one.

Dr. A. J. Parker, of Philadelphia, U.S., found, among 33 negro brains which he examined, two cases in which the convolution in question was perfectly well developed, the brain precisely resembling in this respect that of a gorilla or a chimpanzee. One of these brains belonged to an adult male, the other to an adult female.

Dr. Parker has also observed in another negro brain the complete connexion of two fissures, known as those of Rolando and Sylvius, a feature hitherto

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It is not claimed by the author that the theory of cephalization accounts for all the types of structure found in the animal world, but only that, whatever these types may have been in course of development, they were in general subordinated to the principle of cephalization. "The origin of the grander types of structure," writes Prof. Dana, "must be connected with the profoundest of molecular laws; and how connected man may never know. These views will hold, whatever be the true method of evolution. The method by repeated creations should be subordinated, as much as any other, or molecular, law and all laws of growth; for molecular, law is the profoundest expression of the Divine will. But the present state of science favors the view of progress through the derivation of species from species, with few occasions for Divine intervention. If, then, there has been derivation of species from species, we may believe that all actual struggles and rivalries among animals leading to 'survival of the fittest' must tend, as in man, to progress in cephalization independent of structural changes."

supposed to be peculiar to the brain of Simians. The other discovery alluded to above is due to Mr. Theobald, who has found the upper jaw and palate (fossil) of a large anthropoid ape in the Siwaliks of the Punjaub. It belonged apparently to a female, the canine teeth being small. The creature must have been in size between a gorilla and an orang. The molars are of the anthropoid type; but the bicuspids are much narrower than in any anthropoid ape, and indeed relatively narrower than even in man. The jaw also resembles the human jaw in the small size of last molars and incisors. Among living apes the chimpanzee comes nearest to this fossil. The specimen is especially interesting, as being the first trace of the existence of large anthropoid apes in India, and, from its resemblance to the chimpanzee and gorilla, the great apes of Western Africa.

Whatever view we take as regards man's origin and development, I may safely say there was a time when man never dreamt of warming himself, or preparing his food by artificial heat. He pulled up wild roots, picked wild-fruits, and swallowed raw oysters and mussels as he wandered naked along the beach. He was aboreal, perched himself—watching for prey—crawling on his belly—stealthily approached his prey, and killed it with sticks or stones. His language was monosyllabic, with a hissing guttural sound, resembling the click-clack of the bushman. A cave, a hollow tree, was what he crept into, and there he lay in his lair, gaunt and hungry, till Spring came.

Ages come and go, then he makes a fire and feeds it: a skin tent is his habitation, and a hairy skin his only covering. Then, again, comes rude unhewn huts and cabins: lastly, comfortable houses and stately mansions.

Monkies, without tracing a kindred descent with man, can safely say, Have not animals organs, dimensions, senses, affections, passions, fed with the same kind of food, hurt with the same weapons, subject to diseases, healed alike by medicines, warmed by the same Sun, cooled by the same winter?—prick us we bleed, tickle us we laugh, poison us we die, wrong us we avenge,—we become chagrined and angered; give tea we sip, pipe we smoke, beer we get drunk, clothes we dress ourselves, fire we warm ourselves,—and even imitation is good on our part. Again our nerves are the same as yours: after drink we are cross and gloomy; we catch contagious diseases, our nervous system is excited by stimulants, depressed by depressors, allayed by sedatives, and rendered torpid by narcotics. In tissue and blood, as in nerve, we are like you, and, Venus-like, in all seasons the same as yourselves. In lower ranges of the mind, as in blood tissue, nerve, and brain, we are the same. We provide for safety, post sentries, pick out the strongest and most warlike commander, march in file, and make attacks with sticks and stones, and use our hands and teeth, the same as many of your brother kin in America and Africa. Are we not exercising the same faculties as when you post police? Are we not, then, similar to you in higher ranges of mind?

Certain apes may say you grant certain kinship in the lower faculties, but you claim powers and attributes of which you say we have not the faintest rudiment. Now men in our native woods are not like you: under my Durien tree of Borneo, I see men like myself; they are good at climbing, but of what you call good and evil they seem to know nothing at all.

The gorilla says, men with dark skins like myself meet under my tree, nose flat, and hair crispy like my own, nature sluggish, mortal nature rudimental, his religious nature fastens on things low and gross.

The wide-nosed Monkey of South America says, "Specimens of men[m] under my tree have range of thought and feelings seemingly as low as my own. Religion, another ennobling sentiment, manifests itself first in superstitions: I see savages so near the level of Nature that they have no religion. Again I see others so little above Nature that their only religion is a torturing dread of the unknown."

EVOLUTION.

Prof. Haeckel (1878) congratulated the French *savants* on the great progress, in spite of long opposition, of the theory of evolution;[n] and addressed the French Association of Science in these memorable words:—"The last consequence of that doctrine, the descent of man, not only from the apes but from all the series of lower organic forms, has even been proclaimed and vigorously defended by M. de Mortillet in the Anthropological Section. Certainly, man does not descend directly from any existing anthropoid apes. No serious naturalist has professed that doctrine,

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(m) The vermiform appendix, coccygeal vertebræ, carnivorous features of the canine, and slant-eye which lingers in the Mongolian race, are heir-looms from a pre-arboreal race: or, as Byron says, they speak of "days gone by."

([n]) "The evolutionary history of animals establishes that there is not homogeneousness of development, but that the higher pass through the forms of the lower; that the mammal, for instance, passes through stages at which the lower vertebrates remain fixed. All are therefore pursuing a journey along the same road, though some may travel to a longer, some to a shorter distance. There is thus a parallelism between individual and race development; a close connection between the phases of development in the individual and in the species.

The type of each animal is from the first, as it were, imbedded in the embryo, and controls its evolvement. The embryo never makes any attempt to change from one type to another, but sometimes the tendency to a form and not the form itself is transmitted.

The parallelism that exists between the career of the individual and the career of the race reappears in the life of the world. There which has currency only among the general public and theologians. For a long time frivolous and ignorant people have found a subject of pleasant and innocent gaiety in the thought that we wish to pass them off as improved apes. No one dreams of this; but . . . . . . There can be no doubt that man and the monkeys of the old and new world are descended from a common ancestor."

The theory of evolution, "which considers and embraces entire Nature as one whole, has replaced final causes by efficient causes."

Haeckel remarks that "we cannot say at what moment of time, nor under what conditions, the first living beings appeared at the bottom of the sea, but there can be no doubt that they have been formed

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is a resemblance—indeed more than a resemblance—between the successive forms through which man himself in his prenatal life has passed, and those that have appeared in myriads of ages in the biography of the Earth. Common sense revolts against the ideas that these transformations are in the individual due to divine intervention. In that, and in the case of the Earth, they must be due to natural law.

A striking illustration of slow development is offered by two of the most imposing types of life, the reptile and the mammal. The former is the characteristic of the Secondary, the latter of the Tertiary period. In the Secondary, when reptile life was at its culmination, there were reptiles flying in the air, swimming on or in the sea, crawling on the land, or climbing the trees. After this type of life had reached its culmination, and extinction began to set in, that process went forward in a gradual and orderly way. The flying lizards were the first to disappear, then those of the sea; they now have scarcely any representative left. The fluviatile and terrestrial ones, though greatly diminished both in numbers and size, still maintain a struggle for life; but the complete dying out of animated forms, though irresistible, requires for its completion countless centuries.

While reptile life was in full vigor, mammal life was introduced. It came under the lowest forms, the imperfect orders appearing first.

What does this coexistence of two different forms of life, through immense lapses of time—the one declining and on its way to disappearance, the other marching forward to increase—what does this overlapping mean? Not sudden creation, but slow development. The environment is slowly becoming unsuitable to the one, and slowly becoming suitable to the other."—(Dr. Draper's Lectures).

chemically from inorganic carbon compounds. The primitive monads were born by spontaneous generation in the sea, as saline crystals are born in their mother waters. There does not exist, in fact, any other alternative to explain the origin of life. He who does not believe in spontaneous generation—or rather, in the secular evolution of inorganic matter into organic matter—admits miracle."

He afterwards concluded as follows:—"The time has arrived to replace the antique dualistic and theological conception of light and spirit by the monistic or mechanical conception of the Universe. We have arrived at the boundaries of the old and new faith. Mystery exists, perhaps impenetrable to us of the present age, or modern science; in any case, scholastic arguments will not pierce it. The doctrine of final causes has all the *naivetè* of the explanations which prevail among savages and children; the theories of Lamarck and Darwin have given the last stroke to that decrepit doctrine. Modern morphology is irreconcileable not only, I say, with the dogma of Creation, but with that of a Providence, or of a vague idealistic Pantheism of the kind associated with the names of Hegel, Schopenhauer, and Hartmann."

"The whole analogy of natural operations," says Huxley, in his 'Evidence on Man's place in Nature,' "furnishes so complete and crushing an argument against the intervention of any but what are termed secondary causes in the production of all the phenomena of the Universe, that, in view of the intimate relations between Man and the rest of living animals, and between the forces exerted by the latter and all other forces, I can see no excuse for doubting that all are co-ordinated terms of Nature's progression, from the formless to the formed—from the inorganic to the organic, from blind force to conscious intellect and will." Goethe very aptly expressed himself in these beautiful words:

> "All forms have a resemblance: none is the same to another;
> And their chorus, complete, points to a mystical law,—
> Points to a sacred riddle."

and, again, on animals he says—

> "Hence each form conditions the life and acts of the creature,
> And each fashion of life, with reflex forcible action,
> Works on the form."

Prof. Huxley hints that Nature gives us a box on the ears, and leaves us to discover the cause.

Haeckel, when writing on primary and secondary causes, and extra-mundane power in the creation of animals and matter, says, "extra-mundane power is a matter of faith, and where faith begins science ends" —faith is the mere product of the poetic imagination, science of the understanding; if its conclusions come into contact with the creations of the imagination, the latter, of course, must give way.

"The works of actual Creation," says one of my old Professors, Prof. Dawson, of MacGill, Univ., Canada, "may have been limited to a few elementary types, and evolution may have done the rest."

Evolution presents a higher view of the wisdom and power of the Grand Architect than if each link in the long chain leaped out of nothingness at the fiat of Omnipotence.

The modification on modification of the medium in which we live and move is hastened by a law of Nature stern, severe, but yet as unchangeable as the law of the Medes and Persians. Nature scrambles her bounty amongst the parasites of the Earth, and if any animal possesses a little more cunning and superiority over the other recipients in obtaining a greater share and keeping it, he will survive: if he survives, others will perish as gentle Nature orders it. This competitive law becomes a force by developing slight variations along lines of utility into widely different and specific forms.

Whenever a change occurs it is towards a complex one. Now animals are invigorated by a slight change; hence they improve by an approach towards complexity. Hermaphrodite animals can fertilize themselves, but their organs are so coaptated as to be fertilised by other individuals, the wind or water acting as the go-between. The offspring of such separate unions are always more vigorous than the home-born progeny of the hermaphrodite class, while the home-born offspring are killed off in the struggle for existence, and sexual union, at first an exception, may become an imperative rule.

If we are asked how is it that many species have never changed, while others are undergoing progression—for instance, Man, who has continued to distance all the others, when, as it is acknowledged, his origin was the last and greatest effort of Creation — the answer is plain and natural,—that all forms remain stationary which can maintain their conditions of life unchanged.

"Of chance or change let no one e'er complain."
"Mountains exult where the waves have been."

Savages of the primeval forests migrate to other parts when game is scarce: they remain, therefore, in a hunting state; and the shepherds act on the same principle when pasture is scanty for the flock. But, as in places like Egypt, Holland, Denmark, or England, where the inhabitants are confined to narrow districts, they are compelled by necessity to invent. New modes, power, and desires are necessitated, and the human animal is changed into a progressive stage.

NATURAL PROGRESSION.

When we see the surprising changes in the way of emigration, or even commerce, of only, say, one century, which have altered the natural aspects, and influenced the aborigines, of New Zealand, (o) Australia, and North America, how shall we estimate the results of four hundred years, and a tenfold tide of trade and commerce. When the Caucasian race, with their augmented energies, and higher conceptions of functional relations, have taken possession of all the favorable regions of the habitable globe, the aborigines must amalgamate with the more civilized and enlightened race, or become extinct, being supplanted by the white offspring of a healthier, hardier, and superior development, and endued with newer elasticity of mind and muscle. This sudden extinction of the weak, and the incessant advance of the strong, may appear to some a stern and harsh law, but such are the facts; it is only a question of time, and of mental and material appliances. The whole history of the Old World is but a record of decline and progress—the gradual extinction of the old and effete in our days—Turkey and

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(o) Influence of the Environment.—As a striking instance of the transformation effected in a race by changed conditions of life, Das Ausland quotes from Khanikoff's "Memoir on the Ethnograph of Persia" some observations on a colony of Wurtembergers which, in 1816, settled in the trans-Caucasus country, near Tiflis. The original colonists, we are informed, were "singularly ugly," with broad, square countenances, blond or red hair, and blue eyes. The second generation showed some improvement: black hair and black eyes were no longer rare. The third generation was so entirely altered that their Wurtemberg descent was no longer visible, for now black hair and black eyes were the rule, the face had gained in length, and the bodily habit, while nothing was lost in point of stature, was more slender and graceful. As the chastity of the women is not to be disputed, and as the colonists intermarry only among themselves—Khanikoff found only one case of a Wurtemberger marrying a Georgian woman—the change in the race-characters can be attributed only to the influence of environment.

Spain, for instance,—and the gradual advancement of the young and vigorous. Nor does progress stop with the white race,—by virtue of the great law of Cosmical progress they will be superseded by higher varieties (which varieties probably exist elsewhere, or in coming ages will exist, as Locke and Bolingbroke express themselves) of created beings superior to man,[p] and, as the poet writes—

"What vast infinitude of worlds may grace—
What beings people the stupendous place."

"Earths on Earths may go cycling on" in space, teeming with all kinds of animals and human beings, and we have no reason to deny that planets may be populated with a far superior class of beings than ourselves; and, although astronomers differ as to the constitution and atmosphere of many planets, yet there is no reason for disbelieving that beings may be constituted of etherial matter, and fed with a similar food, so attenuated that we are unable to appreciate, much less to distinguish or discourse of them, by reason of our ignorance of scientific research.

We may feel the effect of a material force, as the wind or gravity, yet we cannot perceive the power or matter which originated the force.

The tremendous astronomic force is neither seen nor heard which every moment holds the compact of the physical Universe together: the lightning is, in fact, but a mere fire-fly spark in comparison; but because it glares on the clouds, and thunders so terribly in the

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(p) Anatomically, man is unfinished—nose is half cartilage, half bone; there is then the breast-bone, then the terminal structure of the spinal column, the vestige of a caudal appendage. Animals have a neater finish than man. Man is left unfinished: we must therefore work out the beast with "appetite, prona et obedientia ventri," and work in man with aspirations.

Dr. Sir Gull says if he had to make a man, he "would make him without tonsils."

ears, and rives the trees or the rock, whence it falls, many will be ready to think it a vastly more important agent than gravity, which

> "Keeps this Earth a sphere,
> And guides it onward in its course."

The fine particles of camphor which affect the nerves of smell, and steam in an active state, are invisible, the same as C.H.N.O., yet we are as certain of their existence as of our own.

As animalculæ exist in water, which require a powerful microscope to distinguish them, so may matter be so attenuated or subtle (spiritual or etherial) that with all the scientific appliances we now possess, or may hereafter discover, we shall be unable for generations, perhaps if ever, to see, much less examine, its peculiar properties; and yet that matter may have as fine, if not far nobler and transcendental a form, surpassing our limited knowledge, as our grade and rank in the animal kingdom, excels the nearly invisible *monad atomus,* or minute mass of protoplasm, the Amœba, or even the Eozoon, which is one of the yet discovered lowest types of animal creation, to whom an atom is a thousand worlds. The scripture says "a spirit hath not flesh and bones as ye see me have," but it is nowhere said that a spirit hath no material parts, or only an attenuated etheric or gaseous form.

When matter becomes too attenuated to reveal itself, they (theologians) complacently call it spirit,[q] and when this etherial matter or electricity acts, they style it a miracle.

All things which exist are material; without matter nothing exists. Matter, however, may, in future ages, turn out to be only varied forms of one primitive element.

(q) "All we can come to now is far from the beginning; but when we reach a point, which has been for thousands of years beyond the comprehension of man, it seems natural to refer it to one almighty

"O, that this too solid flesh would melt,
Thaw, and resolve itself into a dew."—
SHAKESP.

"I to the elements
Resign the principles of life they lent me."
—SIR W. SCOTT.

Cyrus said to his sons, "You will as speedily as possible give back my body to the dust; for what can be more desirable than to mingle with that which produces and fosters all that is beautiful, and all that is good. It will, methinks, give me pleasure to become identified with that which is the great benefactor of mankind."

SUPERNATURAL POWER.

"Hold thou the Good—define it well,
For fear Divine Philosophy
Should push beyond her mark, and be
Procuress to the Lords of Hell."

We may well ask, how is it that, after centuries of doubt, or denial—how happens it, in face of the reason that can make nothing of it, the common sense that rejects, and the science which can demonstrate it as impossible,—the supernatural still has such vital hold in the human, not to say in the modern mind? [r] How is it that the most terrible fear is the fear of the invisible?

"For even the wisest and the hardiest quail
To any goblin hid behind a veil."

This, too, when we are assured on all hands that the visible alone is that which we have to dread? Ordinary reason exhorts us to dismiss our fear. That

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incomprehensible power until the finite mind of man can grasp the infinite."—(MALET. pp. 46).

"If a tale is told with authority, few stop to probe its truth."—(M. p. 60).

"Ring out the darkness of the land,
Ring in the Christ that is to be."

(r) "It is not too much to say that the horrible dread of unknown evil hangs like a thick cloud over the savage life, and embitters every pleasure."—SIR J. LUBBOCK, "Prehistoric Times." 2nd Edit. p. 57.

thing, "magic," that superstition, "miracle," is now banished wholly from the beliefs of this clear-seeing educated age. It is only a superstition arising from a fancied delusion and ignorance. If Nature, as we understand it, or law, as we understand it, be universal, then, as nothing can be possible to us which contradicts either the one or the other (both being the same) —Nature being law, and law being Nature,—miracle must be impossible. Miracles have no claim whatever to the character of historical facts, and are wholly invalid as evidence of any revelation. Miracles can be of no date or time (whether earlier, whether later) if God has not withdrawn from Nature; and if He has withdrawn from Nature, then Nature must have before this fallen to pieces of itself; for God is Intelligence, not life only; and gross unorganized matter is not intelligent, though it may be living.

Schiller says, "Nature (matter) is an infinitely divided God," a doctrine similar to that of Spinoza, who held that God and the Universe are the same, that all events happen by an immutable law of Nature, by an unconquerable necessity. The divine exists in innumerable sensible substances, as a white beam of light is decomposed by the prism with seven colored rays. And an etherial being would be evolved from the unison of all these substances, as the seven colored rays dissolve again into the clear light-beam. The existing form is Nature, which is the optic-glass, and all the activities of spirit are only an infinite color-play of that simple Divine ray.

Matter is the Will of God, and its properties are the same. If the Will of God, He is bound by it: He can will what he pleases, but he must will in accordance with these principles. If God could be supposed to will an oblong or square world, gravitation would still make it round, because one of his own principles.

Admit that God, by a special act of creation, formed man out of the dust, then I can deduce that matter has the capability of becoming a living being; and it must possess an inherent principle of life.

> 'For I have learned
> To look on Nature; not as in the hour
> Of thoughtless youth, but hearing oftentimes
> The still, sad music of humanity,
> Nor harsh, nor grating, though of ample power
> To chasten and subdue. 'And I have felt
> A presence that disturbs me with the joy
> Of elevated thoughts;—a sense sublime
> Of something far more deeply interfused,
> Whose dwelling is the light of setting suns,
> And the round ocean, and the living air,
> And the blue sky, and in the mind of man:
> A motion and a spirit that impels
> All thinking things, all objects of all thought,
> And rolls through all things.'
> —"TINTERN ABBEY."

"Was der Geist verspricht das leistet die Natur."—SCHILLER.

No miracle can be justified to men's minds, because no amount of evidence can sustain it: no number of attestations can affirm that which we cannot in our nature believe. Faith must render an account to reason. Mysteries must give way to facts.

Eusebius says, "What can be better than absolute truth? Are mysteries, miracles, lying impostures, better?"

The intelligent person is fully convinced that, for his personal behoof, Nature's laws have never been changed. They are the same yesterday, to-day, and for ever: for him no miracle is required—no extraordinary mundane power requires exhibition; he is thoroughly convinced that God, being all in all, never requires magical transformation exhibits to keep His children loving and obedient towards Him. Man is aware that he is the temple of God, which is sanctified by the Omnipotent, for he contains the breath of God himself; he attributes justly every event of his life to some antecedent event; this he looks upon as the cause, that as the consequence. When it is jubilantly affirmed that grand interventions have occurred in his neighbour's behalf,—that a Supreme Being is appeased, pleased, angered, or chagrined as a human mortal, and possessed of like passions as ourselves; that he delights in temporary supplications or adorations, in sending us rain or fine weather; or goes abroad as a blood-thirsty Mars, striking at our desire our foes, hip, and thigh, just to please our fancy, irrespective of justice to our opponents—this does not accord with the elevated views we hold of a Supreme Deity. We may, then, well say, Surely our neighbour is deceived, or is practising deception. In reality we believe nothing of which our senses do not convince us,—even these not always.

The conviction of a miracle has nothing of God, except the certain sort of motive of possessed, excluding exaltation, which, *with the miracle,* fills us, and to which exaltation we can give no name, and which we can only feel as a certain something in us, a certain power and a certain light, conquering and outshining another light become fainter: it will follow that the conviction of the possibility of a miracle is the same sort of unquestioning assurance that we have of a dream in the dream itself; [s] and that, when the miracle is apprehended in the mind, it just as much ceases to be a miracle, when we are in our senses, as a dream ceases to be that which it was, a reality, and becomes that which it is, nonentity, when we awake.

Cicero, who lived in the first century before Christ, speaking of the law of right and wrong implanted in

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(s) They whose minds, scorning the humiliation of the body, fly and rush abroad when influenced and excited by some ardor, behold things which they predict. Such minds, which inhere not in their bodies, are influenced by various causes."—Cicero.

man, says—"True law is right reason, conformable to Nature, universal, unchangeable, eternal, whose commands urge us to duty, and whose prohibitions restrain us from evil. Whether it enjoins, or forbids, the good respect its injunctions, and the wicked treat them with indifference. This law cannot be contradicted by any other law, and it is not liable either to derogation or abrogation. Neither the senate nor the people can give us any dispensation for not obeying this universal law of justice. It needs no other expositor and interpreter than our own conscience. *It is not one thing at Rome and another thing at Athens—one thing to-day and another to-morrow,* but in all times and nations this universal law must for ever reign eternal and imperishable. It is the sovereign master and emperor of all things—God himself is its author, its promulgator, its enforcer, and he who does not obey it flies from himself and does violence to the very nature of man, and, by so doing, he will endure the severest penalties, even if he avoid the other evils which are usually accounted punishments, viz., the civil punishments of Earth, and the assumed corporal tortures of hell."—*Cicero, Commonwealth,* B. III, cap. 22.

Professor Maurice says that "it is a blessing that the faith of scientific men in the Bible has not wholly perished, when they see how small *our* faith is, and by what *tricks* (miracles) we are sustaining it. * *

Secondly, I say that we must deliberately abandon that disastrous doctrine of Scriptural infallibility[t] in

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(t) When the celebrated question of antipodes came to be discussed at one of the Great Councils, the Bible was with many the ultimate court of appeal. Augustin, who flourished A.D. 400, would not deny the rotundity of the Earth; but he would deny the possible existence of inhabitants at the other side, "because no such race is recorded in Scripture among the descendants of Adam." Archbishop Boniface was shocked at the assumption of a "world of human beings out of the reach of the means of salvation."

scientific matters—that degrading idolatry of the dead letter—that doctrine of "verbal inspiration, as it is called, which leads, as Bunsen says, to fetichism in worship, to untruth in philosophy, and to unreality in religious thought. . . . It is a doctrine which may be refuted by the plainest and most cogent arguments."

Was it a satisfactory result for one thousand years of theology to end in quibbling about "notions, and relations, and formalitations, and quiddities, and hæcceities which," as Erasmus says, "no eye could follow save that of a lynx, which is said to be able, in the thickest darkness to see things which have no existence?"

It is certain, then, that these ages of undisputed theology were ages of darkness, stationariness, superstition. . . . "The same questions, the same answers," says John of Salisbury, "the same difficulties, the same solutions, sought for, admired, cavilled at, abandoned, repudiated, and again admired." "Behold a school which for five centuries has resounded with disputes," said the pompous cicerone, who showed Casaubon over the Sorbonne. "Et qu'a-ton donc prouvé?" was the very natural and somewhat ironical reply.

If theology be only a true interpretation of the revelations of God, then *Science is itself one of the noblest forms of Theology*. It has deepened indefinitely our sense of the mysteries around us; it is the reading of that world which even Plato himself called "God's Epistle to man;" and which Campanella said was "God's primary autograph;" and which Galileo described as "a great book ever lying open before our eyes, but which cannot be understood until we first know the language and learn the characters in which it is written."

The Old and New Testament (the word of God) is now copyrighted and corrected by the Universities of Oxford and Cambridge. So much for the inspiration of Scripture. If a clergyman of the Church of England, however, shall use the so-called copyrighted Scriptures in the Churches without, forsooth, the sanction of Her Majesty Queen Victoria, he will be prosecuted.

But to return to miracles, I may say that the Theological assumption is worthless until I am told how electricity can be detached and vitalized. Divine interventions are too anthropomorphic, and, as Wicliff said, "God forceth not a man to believe that which he cannot understand."

Mahomed is said to have fed 30,000 men with the heart of a sheep; that he cut the Moon in two; made fountains issue from his fingers; gave speech to the brutes; caused himself to be followed by the forests and saluted by the mountains. And that Buddha put one foot on a mountain and the other in heaven. Millions of people believe these, just as millions believe in the infallibility of the Biblical records; but their believing these does not make them the truth. The days of superstition are numbered, thanks to the advance of intellectual improvement. Up to the present time, to surround anything, however monstrous and ridiculous, with an air of mystery, has been to invest it with a secret charm and power of attraction, which to the masses is irresistible; and it is a well-known fact that the generality of people merely give an unintelligent acquiescence to what their religion teaches.

"It is the mystery of the unknown
That fascinates us; we are children still,
Wayward and wistful, with one hand we cling
To the familiar things we call our own,
And with the other, resolute of will,
Grope in the dark for what the day will bring."

RELIGION AND SCIENCE.

THE antagonism we now witness between Religion and Science is the continuation of a struggle that commenced when political Christianity began to reign. Divine revelations must necessarily be intolerant of contradiction; they must repudiate all improvement in themselves, and view with disdain that arising from the progressive intellectual development of man. But opinions on every subject are continually liable to modification and extension from the irresistible advance of human knowledge.

Can we exaggerate the importance of a contention in which all thoughtful persons must take part, whether they will or no? In a matter so solemn as that of religion, all men, *whose temporal interests are not involved in existing institutions,* earnestly desire to find the truth—

"Where'er it can be found,
Whether on Christian or on Heathen ground."

They seek information as to the subjects in dispute, and as to the conduct of the disputant.

The history of Science is not a mere record of isolated discoveries; it is a narrative of the conflict of two contending powers,—the expansive force of the human intellect on one side, and the compression arising from traditionary faith on the other * * * * * "Science has never sought to ally herself to civil power—she has never attempted to throw odium or inflict social ruin on any human being—she has never subjected any one to mental torment, physical torture, least of all to death, for the purpose of upholding or promoting her ideas. She presents herself unstained by cruelties and crimes. But in the Vatican —we have only to recall the Inquisition—the hands that are now raised in appeals to the Most Merciful are crimsoned. They have been steeped in blood," they bear the mark of Cain, and yet in all their appeals they cry "Lord hear us, for in thy name have we not done all these things." "The attention of many truth-seeking persons has been so exclusively given to the details of Sectarian dissensions, that the long strife in the conflict between Religion and Science is popularly but little known. . . . . . No spectacle can be presented to the thoughtful mind more solemn, more mournful than that of the dying of an ancient religion, one of a thousand superstitions which has fattened priests and propped the State, "which, in its day," like Druidism, "has given consolation[u] to many generations of men." But if that religion is based on a wrong foundation, like that of the Eyptians,

Who "worshipped dogs,
And for their faith made internecine war,"

and if the hopes held out thereby are fallacious and deceptive, surely the sooner the errors of that religious belief, or beliefs, are pointed out the better, especially so when a religion more in accordance with our experience of God's mercy, love, justice, and wisdom, more rational, and one more worthy of man's

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(u) "Courage, then, cries the knight, we may yet be forgiven,
Or, at worst, buy the bishop's reversion in heaven ;
Our frequent escapes in this world show how true 'tis
That gold is the only Elixir Salutis.
All you who to swindling conveniently creep,
Ne'er peddle—by thousands the treasury sweep,
Your safety depends on the weight of the sum,
For no rope was yet made that could tie up a plum."

highest aspirations, can be pointed out, the truth of which, moreover, can, by personal investigation, be proved and demonstrated beyond the possibility of doubt.[v]

"When first Religion came to bless the land,
Her friends were then a firm believing band;
To doubt was then to plunge in guilt extreme,
And all was gospel that a monk could dream."

Now, however, the dawn of Science and Truth, which a cloud of darkness and ignorance had momentarily obscured, is reappearing in all its refulgent rays and plenitude of glory; and well may we say—

"I see the dawn of that golden age
Which bards have sung with deep regret;
It stands as past on history's page,
But I perceive it is coming yet:

The iron age, I allow, is done,
But the golden age is yet to come."

The new and old systems of creeds have their advocates, who cling not like the Ephesians to Diana, for trade lucre, but rather with fanatical devotion to their own systems, and listen to the claims of no other. They will not even allow us God for our father, unless we take their church for a mother. Fired with unforgiving zeal of bigotry and prejudice, they are less merciful than the Red-Indian with his tomakawk gloating o'er his mangled victim. They build rack and jibbet, and elevate torture into a science, the same

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(v) In a miscellaneous congregation, according to certain Christian tenets, one section of the community is predestined to salvation, while the other is foreordained to everlasting perdition. The case of a human being born only to be damned must be utterly hopeless, although it is very consolatory to know that, in respect to them who are called, their beatitude is guaranteed. The elect may act as they like, but they can never be damned. The non-elect may strive after holiness, but they can never be saved. The elect impress on every one to cry abba father, but they should not forget our infinite Mother. For if our Father had prepared a hell in which to roast infants, our Mother would have quenched it with her tears!

as was done in the days of Bruno, Galileo, and Calvin, or even the reigns of Mary and Elizabeth.

Now for us to submit to a miracle-loving Church, which affirms that the AWFUL and ETERNAL BEING could ever be born of an earthly mother, (and, forsooth, the espoused wife of a Jewish carpenter), who has since become the Queen of Heaven, "men must be slaves indeed!"

Celsus, even in the second century, exposed the folly and madness of the Christian sect as then enunciated, and termed them "a pernicious superstition."

Tacitus describes Christians in his day as a set of people who were holden in abhorrence for their crimes, and states that "their distinguishing characteristic was a hatred to all mankind not of their way of thinking." [w]

(w) "We hold this truth to be self-evident, that all men are born free and equal, with the universal right to life, liberty, and the pursuit of happiness."

The "Scotsman" of April 21st., 1881, writes:—"A noteworthy incident occurred the other day at the inauguration of Westbourne Free Church, at Hillhead, Glasgow. Mr. Mirlees, as the Lord Dean of the Guild of the western city had laid, with all appropriate ceremonies, the memorial stone of this newly-completed church. The prayers were said and the psalms were sung in due place and order, and then his lordship delivered his mind in a right manful and unexpected manner. Here are some of his startling utterances:—'I cannot disguise the fact that in late years I have not taken that interest in the Free Church as a corporate society which I once did. To my mode of interpreting her recent deliverances, she is practically forgetting her Protestantism, and seems on the point of committing suicide. To my mind, the Scottish Church has come through no such crisis as the one now before her since the Reformation We are now face to face with the old question, whether men are to be allowed to interpret the Bible for themselves as God may enlighten their judgment, or whether we are to maintain the doctrine that the Bible can only be rightly interpreted through the traditions of the Church? and this, to my mind, is a question of life or death.' And again—'If we are to be told that along with the Bible we must accept as inseparable from its traditions as to its origin and history with which it has been clothed by the church, we run the risk of never seeing beyond the clothes, of never feeling the rich, warm, living, loving heart within.' 'It has been said,' he goes on, 'that Professor Smith, finding himself at variance

Porphyry, the Emperor Julian, and several others, wrote works condemning and exposing the absurdity of the doctrines of Christianity in their time.

Of the writings of Celsus we have only a few fragments preserved in the works of Origen, he having answered one of the works by Celsus about fifty years after it was written. (See Jewish and Heathen Testimonies, vol. II).

A work called the "Everlasting Gospel" appeared many centuries ago, amongst the Catharists, Waldenses, and Petrobussians, which asserted that the public and established religion was a motley system of errors and superstitions . . . . . and a usurpation of the rights of men;" and well might writers demand: Does the Bible owe its authenticity to the Church, or the Church to the Bible?

The Orthodox Tertullian, glorying in the principles of the Christian faith, even as enunciated in his day, is said to have exclaimed, "I reverence it because it is contemptible; I adore it because it is absurd; I believe in it because it is impossible." And so it was, and is.

If we examine the theology of the people chosen as God's elect, it is seen to be as hard as iron, inflexible and bloody, it was the religion of the Jews, the most cruel and blood-thirsty tribe of ancient days; so brutal and avaricious that he (the Jews) was universally hated as despised. His Jehovah was an enlarged view of himself. His religion was like his God. His God's

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with so large a section of the church, should voluntarily resign his office, and thereby gain for himself outside the Church that freedom which is not to be tolerated within. But I look upon this as a most miserable expedient. Can you imagine a man with a spark of heroism tamely allowing the Church, which has been the nursery of his spiritual life, which he has been accustomed to look to as the pillar and ground of the truth, to degenerate into a mere private club, consisting of members associated together for the purpose of maintaining the divine authority of its own traditions?'"

moral disposition, his ideas of right and wrong, were those of the people by whom he was created. He destroyed what they willed. He dwelt in a tent, directed their movements, gave instructions what to do, but always kept himself aloof from the people, and only held converse with Moses as the chief Ruler. His food was roasted bullocks, the same class of food as the priests took from the seething-pots, hence a material form required material nourishment.[x] Again the religion of the Jews assumed arrogance of bigotry, and declared a handful of marauding cattle-lifting savages, the same as Mohammed's Arabs, God's chosen people, authorized to slay and mangle their enemies whenever their interest dictated—to sack cities, and butcher thousands, God thundering his assent, urging them on to carnage, and participating until his garments were red with slaughter. The only plea for robbing their neighbours of their household gods and chattels, and utterly destroying all cities (man, woman, and child), which butchery exceeded that of Cawnpore or Delhi, was, that they were the instruments of God's vengeance, (the same as the Round-head's of Cromwell's time) as revealed through some Urim and Thummim,[y] which Urim and Thummim was similar to the religious philosophy of Yogi, a set of Hindoo devotees, or the signs furnished by the intestines of cattle slain on their idolatrous altars.

(x) "It were better to have no opinion of God at all than such an opinion as is unworthy of Him; for the one is unbelief, the other is contumely."—Bacon.

(y) The two truths—two figures of Re' and Thmei (Thme pl. thmin, Hebrew truth) worn on the breast-plate of the Egyptian priest.

Philo, the Jew, thinks the Urim and Thummim were two small wings, of *revelation* and *truth*, put between the double folds of the breast-plate.

Clement, of Alexandra, says the symbols of the Egyptians are like those of the Hebrews.

The Jews, with all their hard and cruel creeds, did not, however, invent that pernicious doctrine, "hell-fire." It was only when state or political powers saw the necessity of a right-hand supporter that this arose, which was about 600 A.D.

Strabo states that Plato (a Grecian priest) and the Brahmins invented fables regarding Hell; [z] "these things the legislators used as scare-crows to terrify the childish multitude." They cannot be governed by philosophical reason. It is impossible to conduct women and the gross multitude, and to render them holy, pious, and upright, by the precepts of reason and philosophy."

The authors of the Iliad and Pentateuch had no conception of a real heaven or hell; they knew only *Hades* or *Scheol*, where men dwelt as shadows, without pain, without joy; "where the wicked cease from troubling, and the weary are at rest."

"The fiery torches, and snakes of the furies, and spears of the gods, and the whole ancient mythology, are all fables employed as bug bears to overawe the credulous and simple."—(GEO. BOOK).

The Rev. Mr. Petral, in "Pagan Origin of Papilist's" Doctrines, page 138, says, "Indeed there is no sort of torment that was not invented by legislators, mystagogues, poets, and philosophers, to frighten people, under the false assumption of making them better, but the truth is, it was rather to keep them down in subjection."

The Egyptian monuments speak thus, "O Sun, in his egg,—Save thou the Osiris from the god *whose forms* are *mystic*. His eyebrows are the arms of the balance."

The 17th chap. of the Egyptian "Book of the Dead" (Dr. LEPSIUS), or the "Departure from the Day," (Dr. BIRCH); "Code of Existence in the other World" (DEVERIA) was written 1,500 years before Moses, who copied from the Egyptian Books.

(z) "Cursed were the contrivers of the pit of fire supplied with fuel."—(KORAN, Cap. 85).

The Rev. Thayer says, "Of course, in order to secure obedience, they were obliged to invent Divine punishments for disobedience of what they gravely asserted to be Divine laws."

Polybius, 200 B.C., says, "Since the multitude is ever fickle, full of lawless desires, irrational passions, and violence, there is no other way to keep them in order but by the fear of the invisible world, on which account our ancestors, it seems to me, acted wisely when they contrived to bring into popular belief the actions of the gods, and of the infernal regions." "Hell is useless to sages, but necessary to the blind and brutal populace."

Zimmæus (Timæus) says, "So we restrain those minds with false relations, which will not be persuaded by the truth; there is therefore a necessity for instilling the dread of those foreign torments reserved to the criminals in Tartarus, and also by the other fictions, which Homer" (900 B.C.) "has found in the ancient sacred opinions."

The Theologians and Sectaries of the present era would profit from a lesson given by a barbarian king of Arabia Felix in the 4th Century. When pressed by an embassy of the Byzantine Emperor to allow Christians to settle in his domains, and that he would make Christianity the religion of the State, his reply was becoming that of a philosopher: "I reign over men's bodies, not over their opinions; I exact from my subjects obedience to the Government; as to their religious doctrine, the judge of that is the great Creator." [a]

(a) "The final end of the State, says a great writer, "consists not in dominating over men, restraining them by fears, subjecting them to the will of others, but, on the contrary, in permitting each one to live in all possible security: that is to say, in preserving intact the natural right of each to live without injury to himself or others. No; I say, the State has not for its end the transformation of men from reasonable beings into animals or automata; it has for its end so to act that its citizens should in security develop soul and

Seneca says 'those things made the infernal regions terrible, the darkness, prison, rivers of flaming fire, and judgment-seat are all a fable with which the poets amuse themselves, and by them agitate us with vain fears.'

"'Tis the eye of childhood
That fears a painted devil."
—SHAKS. "Macb.," act II, sc. ii.

Colonel Dow, in his "Dissertation on India," says, "the more learned Brahmins affirm 'Hell,' mentioned in the Vedas,[b] was only an intended bug bear to enforce upon minds the duties of morality."

"Hell," according to the Wesleyan Methodist Conference, as described in the Catechism published "for children of tender years,"—who certainly must be very tender indeed to swallow the following prescription,—"is a dark and bottomless pit, full of fire and brimstone. The wicked will be punished in hell by having their bodies tormented by fire. The torments of hell will last for ever and ever."

Hell, in our view, is, however, an inharmonious relation to the laws of our being: it is ignorance fol-

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body, and make free use of their reason. Hence the true end of the State is liberty. Whosoever means to respect the rights of a sovereign should never act in opposition to his decrees; but each has the right to think what he will, and to say what he thinks, provided he content himself with speaking and teaching in the name of pure reason, and do not attempt on his private authority to introduce innovations into the State. For example: a citizen who demonstrates that a certain law is repugnant to sound reason, and holds that for that cause it ought to be abrogated—if he submit his opinions to the judgment of the sovereign, to whom alone it belongs to establish and to abolish laws, and if meanwhile he acts in no wise contrary to law—that man certainly deserves well of the State as the best of citizens. . . . 'No citizen, however, should allow himself to be deluded by those who, for political motives, would adulterate the divinity of religious truth.' 'For truth is the body of God and light his shadow.'—(PLATO).

(b) The compilation of the Vedas was, according to the missionary D. O. Allen, 1,400 B.C.

lowing and resulting woe and wickedness. The crimes of mankind always coin hell. Heaven and hell are not localities, but conditions of mind.

Heaven is around us,—"good deeds, kind words, and loving hearts," these are the elements of Heaven.

For, as the poet says,

> "Where Mercy, Love, and Pity dwell,
> There God is dwelling too."

As the day-spring of Science from on high visits us, so will Ignorance and Superstition be driven from this Earth, and no fear of Gehenna[c] or Eblos will harass us, for, both being dead, we may sing with the poet—

> "Sigh, priests ;—cry aloud ;—hang your pulpits with black,
> Let sorrow bow down ev'ry head,
> The good friend who bore all your sins on his back,
> Your best friend, the Devil, is dead.
>
> Your church is a corpse ; you are guarding its tomb ;
> The soul of your system has fled ;
> The death-knell is tolling your terrible doom :
> It tells us the Devil is dead.
>
> 'Twas knowledge gave Satan a staggering blow ;
> Poor fellow, he took to his bed ;—
> Alas ! orphan'd priests ! that things should be so ;—
> Your father, the Devil, is dead.
>
> You're bid to the funeral, ministers all,
> We've dug the old gentleman's bed ;
> Your black coats will make a most excellent pall,
> To cover your friend who is dead.
>
> Aye, lower him mournfully into the grave ;
> Let showers of tear-drops be shed :
> Your business is gone ;—there are no souls to save ;
> Their tempter, the Devil, is dead.
>
> Woe comes upon woe ; it is dreadful to think,
> Hell's gone and the demons have fled ;
> Poor lost souls have broken their chains, ev'ry link ;
> The Jailor, who bound them, is dead.
>
> Camp-meetings henceforth will be needed no more ;
> Revivals are knocked on the head
> The orthodox vessel lies stranded on shore ;
> Her Captain, the Devil, is dead."

(c) "Hell shall be destroyed at the resurrection."—ZENDAVESTA.

To reach heaven, or "principle," as Confucius calls it, we must abide and be governed by the Eternal Truth.

Oh ! Truth, thou beauteous gem, thou pearl of all the seas,
Visible throughout God's works to men of all degrees,
Shine forth in all thy splendour, enlighten every mind,
Extinguish cherished errors, emancipate mankind.

From bigotry and priestcraft the souls [c] of men release ;
Let superstitious follies and false religions cease ;
Then true worship by our acts shall senseless creeds displace,
And base notions of our God no longer man disgrace.

To find out the principles of truth [d] we must have freedom of thought—for it is

"Not in the church, by thousands trod,
Seek I, and find Thee, oh my God !
Not where the swelling anthems rise,
And lifted eyes salute the skies ;
Not where hired priests alone may dare
The truth (?) to speak, to breathe the prayer,
And crowded congregations stand,
To talk with God at second hand ;
For there come human pomp and pride,
Fashion and vice stand side by side—
The hypocrite, with shining face,
And the backsliding saint embrace.
Dark hearts and blood-stained hands are there,
Souls dead to truth, ears deaf to prayer ;
Men who their brethern buy and sell,
Who seek not heaven, who fear not hell,
Men who on gold their hopes have built,
Who covet gain, and wink at guilt ;
Men who on sensual visions gloat,
While prayers and praises fill the throat ;
And there the preachers (richly fee'd)

(d) When I was young Cebes, it is surprising how earnestly I desired that species of science which they call physical."—(Socrates, in Phædo).

Mahommed believed in raising himself to the knowledge of the Great Being by pursuing the concatenation of natural causes, which exists of necessity: read "O thou soul which art at rest, return unto thy Lord."—(Koran, xxxix).

(c) "Our souls are, indeed, of the same essence as the stars."
"O vitæ philosophia dux, virtutis indagatrix."—"O philosophy, conductress of light, searcher after virtue."—(Cicero).

What was written by Esdras under the willowed brooks of Babylon, 2,500 years ago, is as true now as then. "As for Truth it endureth, and is always strong; it liveth and conquereth for evermore." It is like the star which shone for Abraham, which had no fairer sky than ours.

Their empty declarations read,
Set prayers pronounce, set forms go through
And *talk* the good they ought to *do*."

"Not there, my God—I come not there,
Thy presence and its joys to share;
Not there my spirit feels Thee near;
Not there Thy still small voice I hear;
Not there my heart with love swells high,
Not there I learn to live and die;
Not there the inward strength is given
To conquer earth, and enter heaven."

"But 'neath the broad, o'erarching sky,
In the free winds that hurry by,
In the bright orbs that shine above,
In all things that have life, and move,
In the deep sea's resistless might,
In the still watches of the night,
In song of birds, and laughing rills,
In cultivated vales and wood-crowned hills,
In all that greets my wondering eye,
I feel, I own that Thou art nigh."

"Oh, not through seemly forms or creeds,
  By man, with skilful thought, designed;
To me he comes, the primal God,
  The Sov'reign Force, the Central Mind.
The tidal pulse of Nature's heart,
  He buds and blooms in summer hours;
He comes in Autumn's flush and fruit,
  In winter's crown of hoary flow'rs.

He floods the morn with orient tides;
  His golden glory noon unbars;
In sunset's flamy car he glides;
  He wheels through night in pomp of stars;
He moves along the storied past
  A power to will, to plan, to guide;
He works throughout the world to-day,
  To animate, inspire, provide."

Twenty-five hundred years ago, an old Asiatic story, mingled of myth and fact, tells us, Gautama-Buddha sat under the sacred Bodhi-tree, in meditation seeking Truth. Mara, the Prince of Darkness, sent strong enemies and crafty tempters to affright and confound him, and among them, as Edwin Arnold tells us in his great poem, "The Light of Asia," came—

> " She who gave dark creeds their power,
> Silabbat-paramasa, sorceress,
> Draped fair in many lands as lowly Faith,
> But ever juggling souls with rites and prayers ;
> The keeper of those keys which lock the Hells
> And open Heavens. 'Wilt thou dare,' she said,
> ' Put by our sacred books, dethrone our gods,
> Unpeople all our temples, shaking down
> That law which feeds the priests and props the realms ? '
> But Buddha answered, 'What thou bidd'st me keep,
> Is form which passes, BUT THE FREE TRUTH STANDS ;
> GET THEE UNTO THY DARKNESS.' "

In seeking for the truth we must view what is called "Revealed Religion," not as truth, for it has never been proved such, but as a sentiment and a taste, not an objective fact, not miraculous. Devotion is not necessarily founded on faith. Man may go to Protestant, to Catholic, to Buddhist, or Brahma, or to Hindoo churches,—may get good from all and belong to none. They may fraternise together in spiritual thoughts and feelings without having any views at all of doctrine in common, or seeing the need of them. Since, then, religion is so personal a peculiarity so private a possession, we must of necessity ignore it in the intercourse of man with man. If a man puts on a new religion every morning, what is that to us? It is as impertinent to think about a man's religion as about his management of his family. Religion is in no sense the bond of society, for from nearly the Creation it has ever been the cause of inciting father against son, and severing the ties of brotherhood. It has been at the foundation of nearly all wars and fanaticism. To enjoy liberty of conscience, that is, to act according as our sense of duty prompts us, very often, no doubt, leads to calvary. We must, however, bear in mind that,

> "When a deed is done for freedom,
>   Through the broad Earth's aching breast
> Runs a thrill of joy prophetic,
>   Trembling on from east to west;
> And the slave, where'er he cowers,
>   Feels the soul within him climb
> To the awful verge of manhood
>   As the energy sublime
> Of a century bursts, full-blossomed,
>   On the thorny stem of Time."

FREEDOM OF THOUGHT.

FREEDOM of thought is forced on us through the necessity of the case, the same as religion was, as a political necessity. The priesthood, in order to curb that freedom of conscience, and at the same time aid them in their political power, invented hell, with its powerful adjuncts of fire, and brimstone, and red-hot pincers. The infernal punishment was ready on hand for the Church. It was current with the populace, and in the schools of philosophy. Hell was ready on the pages of the written word now amended and copyrighted, and the parable of Dives and Lazarus furnished a splendid example for the judicial exercise of the torturing system. Thus purgatory was considered so necessary to the priestly power that they made it an essential doctrine of the so-called Christian Church as early as the fifth century.

> "They for themselves, they carve out creed and laws,
> And weigh their atoms, and divide their straws.
> See yonder preacher, to his people pass,
> Borne up and swell'd by tabernacle-gas:
> He rails, persuades, explains, and moves the will
> By fierce bold words, and strong mechanic skill."

Freedom of thought constitutes the religion of perhaps half of the population of France, the United States, and Great Britain. Every dozen persons whom you indiscriminately meet in the streets have a share in political power. When you inquire into their forms of belief, perhaps they represent one or other of as many as five or six creeds. How can they possibly act together in municipal, or in national, matters if each insists on the recognition of his own religious denomination ? All action would be at a dead-lock unless the subject of religion was ignored. We cannot help ourselves. And it must be borne in mind that there is much in the liberalistic theory which is good and true; for example, the precepts of justice, truthfulness, sobriety, self-command, and benevolence, are amongst its avowed principles. It provides the broad, fundamental, ethical truths of justice, benevolence, veracity, and the like, proved experience, and those natural laws which exist and act spontaneously in society and in social matters, whether physical or psychological—for instance, in government, trade, finance, sanitary experiments, and the intercourse of nations. As to religion, it is a private luxury which a man may have if he will, but which of course he must pay for, and which he must not obtrude upon others, or indulge in to their annoyance. Hitherto it has been considered that religion alone, with its supernatural sanctions, was strong enough to secure the submission of the mass of the population to law and order.

But facts show the experiment has failed. Men of science, philosophers, and politicians are compelled to satisfy the problem without the aid of Creeds or Sectaries. They are now solving the problem by the true test of the liberalistic theory, which is sweeping into its ranks great numbers of able, earnest, good men of approved antecedents, and young intellectual persons with great prospects and a splendid career before them. And unless the priesthood wish to give up their influence and power they must progress with liberal and enlightened [f] views, or the Spanish proverb will ever be cherished, that "an ounce of mother is worth a pound of clergy"; or, in other words, a little common sense is worth all the *ipse dixit* of the theólogical schools.

"The partisans of traditional religion in this country do not know, I think, how decisively the whole force of progressive and liberal opinions on the Continent has pronounced against the Christian religion. They do not know how surely the whole force of progressive and liberal opinion in England tends to follow, so far as traditional religion is concerned, the opinion of the Continent. They dream of patching up things unmendable, of retaining what can never be retained, of stopping change at a point where it can never be stopped. The undoubted tendency of liberal opinion is to reject the whole anthropomorphic and miraculous religion of tradition as unsound and untenable. On the Continent such opinion has rejected it already.

(f) "There is a sect, originated lately, called 'Secularists,' their chief tenet being that, as the fact of a future life is (in their view) susceptible of some degree of doubt, while the fact and necessities of a present life are matters of direct sensation, it is prudent to attend exclusively to the concerns of that existence which is certain and immediate, not wasting energies in preparation for remote and merely possible contingencies. This is the creed which, probably with most exactness, indicates the faith which, virtually, though not professedly, is held by the masses of our working population."

There appears to be at present a considerable degree of religious fermentation in Russia, and sects of all kinds are daily springing up. One of these new sects, the Philipovtzi, preach suicide by fire and starvation as the greatest of Christian virtues. The "Child-Murderers" think it their duty to people Paradise with the souls of innocent children. The "Stranglers" believe that people can only enter Paradise by a violent death. Other sects are the "Flagellants" and the "Skoptzi," or Mutilates. The Skoptzi number about 100,000 persons of both sexes.

One cannot blame the rejection. 'Things are what they are,' and the religion of tradition, Jew, Mohammedan, or Christian, *is* unsound and untenable. A greater force of tradition in favor of religion is all which now prevents the liberal opinion of England from following the Continental opinion. That force is not of a nature to be permanent, and it will not, in fact, hold out long."—(M. Arnold). For the living age is beginning to view subjects in the same light as Milton expressed himself.—

> "That which before us lies in daily life
> Is the prime wisdom."—(Parad. Lost).

Were we to deprive the world of the supernatural terrors, to some it might appear very distressing. But a destruction of sectarian beliefs or dogmas does not necessarily mean the destruction of truth and morality, or the withdrawal of moral restraint. It is only handing over the incubus with which truth is taxed by the ignorant or vicious to that figure, death, "which keeps the keys of all the creeds." To love virtue because the lovers of vice will be eternally tormented is only paying a price to the Devil, and is but a poor sacrifice to the welfare of mankind. A man who becomes benevolent only through fear of eternal damnation, his life is a lie, and his death a swindle. The Christian, Jew, Buddhist, Brahmin, or Mohammedan who leads a moral life in this world merely to go to Heaven in the next is no further to be commended than the hotel-keeper who retails liquors in order to purchase the ease and retirement of a private villa. But the strong-souled man, who lives uprightly because he feels that selfishness and sin injure the welfare of his fellow-man, who does that which is his duty, that which he and all other free souls know to be their duty, without hope of present fee or future reward, that man needs not the ministrations of priests, and demands not the "consolations" of any creed or dogma. "But while honest men admit the moral grandeur of such a nature, they—being believers in a church of one sort—regretfully assert that outside the pale of that church there is no future salvation, or—being believers in a church of another sort—that the mass of mankind will not be governed by pure morality, and that the innate viciousness of human nature can only be controlled by forcing men to believe in matters their reason rejects, and by threatening them with unbearable torments. To the believer who roundly protests that his miracles are true, and that his church will last for ever, nothing can be said. He has surrendered his judgment, and put himself outside the pale of reason." But the doubter, the earnest pietist, the clinger to old forms, the sorrowful tribe of augurs who sigh, not smile, when they meet each other, may be asked to consider if humanity will really lose or gain by the extinction of a belief in the Supernatural. Religion, however, can never die, for it is a political necessity.[g] It was political necessity which created it and nourished it, and which has moulded and will ever mould its outward forms to suit the requirements of the times.

Each religion peoples a future state with beings of its own creation—strong feelings and ignorance engender myths. The bard and prophet of hoary antiquity were assimilated in one person, the bard expressing and harmonizing public feeling, and the people believed that as inspired which was harmonized. In this manner religions and religious feelings were generated.

Canon Kingsley says, "Man can do what lower animals (happily for them) cannot,—organize his folly,

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(g) Guizot affirms that the Church has always sided with despotism, but it must be remembered that in the policy she follows there is "much of political necessity,"—N.C.

erect his superstitions into a science, and create a whole mythology out of his blind fear of the unknown." And when he has done that—woe to the weak.

Lecky, speaking of Christian Hell, says, "It is impossible to conceive a more ghastly, grotesque, or material conception of the future world than they (Christians) evince, or more hideous calumnies against that Being who was supposed to inflict upon his creatures such unspeakable misery." Their doctrine is conceived in the following verse—

> "Nothing is worth a thought beneath,
> But how we may escape that death
> That never never dies—
> How make our own salvation sure,
> And, when we fail on Earth, secure
> A mansion in the skies."

The world, I may, however, say, is a noble vessel freighted with millions of souls, boundless stores in her deep hold, fairly started, sails full set, best of captains, who will hardly run her on rocks for the sake of making a raft for a few noisy passengers and leaving the rest to perish.

MIRACULOUS CREATIONS.

MIRACULOUS creations cannot be made a subject of research: faith may accept, but reason cannot grasp them, and miracles are only myths, having no real existence. They all sprung up in a mythical age, prior to historical age and reason. "The miracle, by the very multiplication of its manifestations, becomes incredible and inconsistent with any worthy conception of an all-seeing, all-provident, Omnipotence."—(Owen.) From the moment of the Earth being established, all things sprung from a secondary cause, and no single substance can be said to be either permanent or primary; and as Nature never repeats itself in time, any more than in space, forms once gone disappear for ever,—and so long as this Earth, with all the heavenly host of spheres, goes cycling on in space will we see new forces and bodies evolved, and, being evolved, of a far superior class, surpassing each other, of a more transcendental nature, even as the twinkling of one of the nebulæ is excelled by the bright glare of the noon-day Sun.

It is not merely that creation in this case will be concomitant with extinction of the species, but new creations are ever assuming more exalted ordinal forms of the same primal pattern; and the man of the future will excel the present man as much, or more, as the Caucasian excels the primitive bushman, or Andamaner. Prof. Owen (pref. to Comparative Anat. and Phys. of Verteb.) says, "In the lapse of ages, hypothetically invoked for the mutation of specific distinctions, I would remark that man is not likely to preserve his longer than his contemporary species theirs. Seeing the greater variety of influences to which he is subject, the present characters of the human kind are likely to be sooner changed than those of lower existing species. And with such change of specific character, especially if it should be in the ascensive direction, there might be associated powers of penetrating the problems of zoology so far transcending those of our present condition as to be equivalent to a different and higher phase of intellectual action, resulting in what might be termed another species of zoological science."

We should at all times, in searching after truth, begin by the best possible means of clearing our minds from the cobwebs which too often obscure our thoughts, bias our judgments, and dim our recognition of its existence. We should also avoid the deadly upas of superstition, prejudice, and fables;—the former, as Cicero says, "pursues and oppresses its victim, compassing him about wherever he goes. Prejudice warps his every effort in searching after the true inheritance, whilst fables are unworthy the notice of any honest man;" and he remarks, "do you suppose me so insane as to believe in such fables." "Let us awake," says Plutarch, "we have dreamt enough;" and Lucretius (B. I, 641) writes, that "fools admire and like all things the more which they perceive to be concealed under involved language, and determine" (fables) "things to be true which can prettily tickle the ears, and are varnished over with finely-sounding phrases," and "this terror" (superstition), "therefore, and darkness of mind must be dispelled not by the rays of the Sun and the glittering shafts of day, but by the aspect and law of Nature," and "fables and superstition, having a strong hold even on adults, they resemble children who are flurried and dread all things in thick darkness, even as we at times in daylight fear not a whit more to be dreaded than what children shudder at in the dark, and fancy sure to be." (LUCRET. B. III. v. 78).

The miracles [h] in the gospels are like the miracles in Plutarch's life; they do not lessen the value of the biography, and the value of the biography does not lessen the absurdity of the miracles.

(h) According to Hegel, the question of the facts in the gospels and epistles, as attesting truth, is nothing better than a question about the mythical Romulus and Remus.

Professor Dodwell, in his "Dissertations on Irenæus," avows that he cannot find in ecclesiastical antiquities any evidence at all that the four gospels were known or heard of before the time of Trajan and Adrian, *i.e.*, before the middle of the second century. Dr. Davidson, in his "Introduction to the Study of the New Testament," writes:—"Before A.D. 170 no book of the New Testament was termed scripture, or believed to be divinely inspired." Little reliance can be placed on statements, inspired or otherwise, which were not written until so many years after the death of the leading character to which they refer. The Rev. H. N. Wollaston, writing in "The Melbourne Review", of April, 1877, remarks: "There does not exist in the World a single manuscript of any portion of the Old Testament or New Testament which is an original autograph." We have consequently only copies of the Gospels, not "of," but "according to," Matthew, Mark, Luke, and John. As to the original gospels of these men, we have no proof that such writings ever existed, but we have strong presumptive evidence to the contrary, for had they been in existence in the days of the early Church Fathers these men would have made reference to them in their controversies with heretics. Of the various manuscript copies of the New Testament extant, not two of them agree, none of them were written before the fourth century, and of

In a late number of an influential London magazine, the "*Contemporary Review*," its editor, John Morley, tells "how Dogma is to disappear before Truth."

"The growth of brighter ideals and nobler purposes will go on, leaving ever and ever farther behind them your dwarfed finality and leaden moveless stereoscope. We shall pass you on your flank; your fiercest darts will only expend themselves upon the air. We will not attack you, as Voltaire did; we will not exterminate you; *we shall explain you.* History will place each dogma in its class, above or below a hundred competing dogmas, exactly as the naturalist classifies his species. From being a conviction it will sink to a curiosity. From being a guide to millions of human lives it will dwindle down to a chapter in a book. As History explains your dogma, so Science will dry it up. The conception of law will silently take the place of the conceptions of the daily miracles of your altars, which will seem impossible. The mental climate will gradually deprive your systems of their nourishment, and men will leave your system, not because they have confuted it, but because, like witchcraft and astrology, it has ceased to interest them."

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these several contain numerous alterations, whilst in others the most palpable interpolations exist. Mr. Wollaston, in the article above referred to, admits that "no two manuscripts, either of the Hebrew or Greek Scriptures, verbally agree."

As far back as the commencement of the fourth century, Bishop Faustus—one of the few exceptions to the generality of the priesthood—had the candor to declare openly that the four Gospels were not written by Matthew, Mark, Luke, and John, whose names they bear, but by unknown persons who professed to write according to them. He wrote:—"It is an undoubted fact that the New Testament was not written by Christ himself, nor by his Apostles, but, a long while after their time, by some unknown persons, who, lest they should not be credited when they wrote of affairs with which they were little acquainted, affixed to their works the names of Apostles, or of such as were supposed to have been their companions, and then said they were written "according to them." (Faust., lib. ii.)

Whatever view we take, whether scientific or religious, one great object of our life in the visible Universe is obviously to learn, and this "is the victory which overcometh the world."

Science is nothing else than Man's intellectual representative of the phenomena of Nature, his conception of the order of the Universe in the midst of which he is placed. "*Crescit enim cum amplitudine rerum vis ingenii.*" "*For the power of the intellect is increased by the amplitude of the things that feed it.*" Renan says, "We shall never keep the world in order until Science has learned how to explode the globe." And it is not unto subtle hypotheses, creeds, Bible, or blind tradition, that we must turn for a knowledge of the Universe, but to the direct investigation of Nature by observation and practical experiment. Again, we must never become partisans of any creed or doctrine which is not in accordance with common sense, *(koinonoemosune, sensus communis)*, reason, and sound judgment. No man can ever expect to obtain a knowledge of truth who has sworn everlasting fidelity to a cordon of rules, of sectaries, and creeds invented by erring[1] man. There should be no cloud of fears and hopes, desires and aversions, brooding and hanging around our understanding, or we shall never then be able to discern objects clearly; their colors, dimensions, will be confused, distorted, and obscured by the intellectual mist. Our business is to inquire what is true; not what is the finest theory; not what will supply the best topics of pretty composition and eloquent declamation, addressed to the prejudices, the passions, and the ignorance of our hearers. We need not fear the result of investigation, or conceal the light under

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(1) "Nothing is so dangerous for a priest in the sight of God, or so disgraceful before men, as not to speak out fully what he thinks."—(St. Ambrose).

a bushel: truth is like a native rustic beauty, most lovely when unadorned and seen in the open light of day: your hypothesis and fine-spun theories are like the unfortunate females who supply the want or the loss of native charms, and repair the breaches of age or disease, by paint, finery, and decorations, which can only be exhibited in the glaring lights, the artificial atmosphere, and the unnatural scenery of the theatre or saloon. Whenever it is thoroughly discussed, truth will not fail to come, like tried gold, from the fire.

Reason and free inquiry are the only effectual antidotes of error. Give them full scope, and they will uphold the truth by bringing false opinions and all the spurious offspring of ignorance, prejudice, and self-interest before their severe tribunal, and subjecting them to the test of close investigation. Error alone needs artificial support: truth can stand by itself. The missionaries of Science are abroad, and, almost simultaneously, the educated Mussulman is informed that his paradise is a dream, the Brahmin that his self-denial is a folly, and the Buddhist that his hopes in Nirwana are as unreasonable as the fears of purgatorial fires, or the expectation of the musical glories of the orthodox Christian heaven—which heaven is asserted by Confucius to be principle. St. Chrysostom says the true Schekinah is man, and when we touch him we touch heaven.

The Hindoo heaven is superior to the Christian one. The Hebrews borrowed all their fine rhetorical figures and language, used by their chroniclers, from the poetical Hindoo. His paradise is all the heart can desire. Sky of softest cerulean, waters of the clearest crystals—and umbrageous trees and odoriferous flowers perfume the air. The most enchanting melody is made by the spirit of music and singing stars. The floor is of gems, pillars of the temple are precious stones; God-like saints and beautiful women wander through the groves beneath the silver light, devoting their time to contemplation and sacrifices to the Gods. Now in all those religious theories, schemes and systems which embrace cosmogony, or which may otherwise enter into its domain, must, as a necessary consequence, submit to the control of Science. Christian morality can only be enforced and sustained by natural laws, or it is in vain to teach it as a standard rule of conduct in secular affairs. All efforts to the contrary have proved disastrous, and is an *ignis-fatuus* in the present era. Every system, civil or ecclesiastical, which does not adjust itself to the environments, or become plastic with the growth, of knowledge, must perish. The measure of the people's knowledge is the true measuring-rod of the sects, creeds, or dogmas. Educate the growing race to understand the discoveries of Tyndal, Huxley, or Darwin, and you will find them pleasantly smiling at the good old fables of the Paradise Serpent, Noah, Jonah, Balaam, and Lazarus.

Mankind, free from the terrors of future torments, and comprehending that by no amount of prayers, bead-worship, genuflexions, crosses, or pulpit orations can they obtain happiness for their souls, will bestow upon humanity the fervour which they have hitherto wasted in sighs and hymns. The creed which teaches that the intellect should be distrusted will fade away. The interests now felt in churchmen's disputations will be transferred to discoveries of Science. The progress of the world will be the sole care of its inhabitants.

The saving of our[j] souls in that mysterious other world has been held of more consequence than the

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(j) That person who gives all his thoughts on his death-bed to ideas of white raiments, beautiful mansions, meandering rivers, and ever-flowing river frontages, and yet leaves his darling wife, to whom care and culture of mind and body here, and the belief in certain dogmas of hell, devil, and Jewish Jehovah, and in demoralizing mysteries like the vicarious atonement, of higher moment than the noblest conduct of our lives on Earth. These views, so arbitrarily imposed, are fading away, and it is no wonder that many grope in the dark as they look toward the grave, or that brave and strong hearts prefer the good work to be done here and now, to the cold and narrow intolerance and the irrational lifting of creed above reason and sound judgment.

When dogmatic and sectary views are thrust unwillingly upon us, and against our common sense and judgment, we naturally resent such intrusion, and, in the name of Science and Reason, we become antagonist, and show "no surrender." Science never retreats from its position while it has forced the so-styled infallible relations to bend before its invincible evidence. For

> "Philosophy parts the beamy light with skill profound,
> Metes the thin air, and weighs the flying sound,
> 'Tis her's the lightning from the clouds to call,
> And teach the fiery mischief where to fall."

There never can be two fields of knowledge; the words and works of God cannot possibly be at variance; it is only in the interpretation, and this makes all the difference. "There is a communication between Science and Religion, an avenue leading through one to the other; but the avenue through the unseen Universe is closed, and, unfortunately, is walled and ticketed with "*No road this way*," professedly alike in the name of Science at the one end, and in the name of Religion at the other."—(UNSEEN UNIVERSE, p. 272).

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he has sworn to love and cherish, to perish in a poor house, and his children paupers on public charity without making an adequate provision for them,—his God is a fiend and his death a swindle on the community.—N. C.

"Religion, though valuable in itself, is only man's speculative creation. It is good for man to frame for himself a theology, if only to keep him quiet." (Tyndal).

Thomas W. Higginson has well said, "The great religions are but larger sects; and we shall want the truths of all,—the errors and dogmatism of none of them."

"Science discloses the method of the world, but not its cause,—Religion its cause, but not its Method; and there is no conflict between them, except when either forgets its ignorance of what the other alone can know." The culminating point of Man's intellectual interpretation of Nature may truly be stated as his recognition of the Unity of the Power of which Nature's phenomena are the diversified manifestations—towards this point all scientific inquiry now tends. Certain persons imagine that Science is in direct antagonism to Religion whenever the question of progressive development is mooted, but they are mistaken, for Science is by no means opposed to true Religion: its only aim is to find out the truth,

> "Wher'er it can be found,
> Whether on Christian or on Heathen ground."

It is always far better to doubt where facts cannot be proved, for honest doubt has more faith than is found with half the creeds. Bacon says, "If a man begins with certainties, he ends in doubts, but if he be content to begin with doubts, he shall end in certainties." Socrates said the surest way of gaining admission to the temple of wisdom was through the "portal of doubt," and he knew only one thing, "his own ignorance." We are left to our own reason with which we are endowed to decipher from the phenomena which this world displays, and, being gifted with certain faculties, we are then left to our own self-development. This self-development is wholly derived, as Spencer thinks, from experience—not individual experience, but accumulated experience of our ancestors, transmitted hereditarily.

"Science does not claim of you to erect it into an idol, as some do with the Bible: no, it asks, whether right or wrong, freedom of discussion; and if man's mind is unsatisfied with it, it allows him, with the yearning of a pilgrim for his distant home, to turn to the mystery from which he has lately emerged. It also teaches us to refuse the offered shelter of sweet repose and error, to scorn this base repose, and to accept, if the choice is obligatory, commotion before stagnation, the leap of the torrent of truth before the stillness of the dismal swamp of error and superstition." (TYNDAL).

Science is the glad tidings of joy and truth to mankind; it is the true Schekinah and ever-burning oil in the lamp of Elohim's temple, and he who refuses to read Nature's Book by the light of it is closing his intellect to the full rays of the noon-day Sun of truth and investigation.

True Religion and Science must go hand in hand, for there is no variance or shadow of turning in God's written and revealed law. The written law is engraved in the Book of Nature, and on all visible matter with his finger, and no man can add to or diminish therefrom. This is the true and only Book he ever gave to man, and his revelations are Man and Creation.

God's foreknowledge is intimate, hence no failures, and if his power is infinite, there will be no limitation of choice, except as to the means which will best conduce to the end in view,—and the laws which govern the Universe have always existed, and no subsequent change in this plan has been required. Goethe has admirably expressed himself on the connection of Science and Religion in these beautiful words,

"Whoso has art and science found,
Religion, too, has he;
Who has not art nor science found,
His should Religion be."
"Wer Wissenschafft und Kunst besitzt,
Hat auch Religion;
Wer jene beiden nicht besitzt,
Der habe Religion."

Science* has unfortunately been prosecuted under the garb of religion[k] from the time of Galileo, when his opponents refused to look at the satellites of Jupiter through his telescope, fearing of being tainted with heresy; so there are too many at the present time who refuse to admit even a gleam of reason into the dark chambers of their intellects, where they hide as sacred treasures the antiquated beliefs of past and barbarous ages, the worthlessness of which would be at once seen, if the full glare of sunlight was permitted to shine in upon them. With many creeds, they are taught from infancy to believe that Faith and Morals are beyond human ken, impressed with Apostolic succession as the conservator of truth, warned that to doubt is sinful, to investigate is mortal sin; and, alarmed by the dangers which appear inseparable

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(k) The reply of King Phillip to Pope Boniface, when the latter demanded unconditional subjection to the Church and Pope, would be an applicable reply to the ostentatious demands of prelates and ministers on men of Science :—

"Know thou, O supreme fool, that in things temporal we are not subject to any one."

* "The youth of Ireland will imbibe Science, they will be leavened by it," irrespective of spiritual barriers against the intrusion of Infidelity" (Science). Its inward modifying power I look to for the abatement of various incongruities of those mediæval proceedings which, to the scandal and amazement of our 19th century intelligence, have been revived among us," as to a carpenter's espoused wife being the mother of God, and said conception caused by the secret influence and action of the "Lord of all men."

from unrestrained freedom, and feeling comfort and contentment in being relieved from all responsibility as to their formation of views and opinions, they quietly submit to the dictation and demands of their Church, and give entire acquiescence to every dogma, however absurd, which she imposes on them.

Traditions and dogma transmitted by parents to children are imbibed by the latter almost unconsciously from what they hear and see around them, without any special season of teaching, or special persons to teach: this becomes part and parcel of their natures—a standing habit of thought and mind, and a fixed set of mental and natural tendencies. It is not set forth by proclamation, nor impugned, nor defended; it is enforced, as in all countries, by sanction of custom or force—by fear of the gods' displeasure, and by certainty of evil from your neighbours or fellow-citizens.

The community, as well as many ministers, hate, despise, detest, and deride liberalism in any individual who proclaims his dissent from their social creed, or even openly calls it in question—the latter fearing danger to their craft, the same as in the time of the Apostles, when the priests and artists cried up their "darling pet," "Great is Diana of the Ephesians." Their hatred manifests itself in a multitudinous manner; sometimes burning or excommunication, banishment, boycotting, or interdiction of fire and water; at the very least, by exclusion from all forbearance, goodwill, and public estimation. The orthodox public do not recognize in any citizen the right to scrutinize their doctrines or creeds, and to reject them if not approved by their own rational judgment. They expect every one to embrace them, in the natural course of things, by the mere force of authority and contagion, as they themselves have done as regards the current language, weights, measures, and the divisions of time, &c.

"Law and custom, king of all, exercise plenary power, spiritual as well as temporal, over individual minds, moulding the emotions as well as the intellect according to the local type,—determining the sentiments, the beliefs, and the predisposition in regard to new matters tendered for belief, of every one,—fashioning thought, speech, points of view, no less than action—and reigning under the appearance of habitual, self-suggested tendencies."—(PLATO, and the other Companions of Socrates, Vol. I, p. 249).

The bigoted theologian has no objection to swallow our railways, telegraphs, gas-lights, steam-boats, and other improvements, or scientific discoveries, which they can apply to their own personal comfort; but when the last and noblest effort of Creation is the subject under review, their prejudiced minds think ours should be cribb'd, cabin'd, and confin'd by narrow and erroneous interpretations of the Bible;—which said Bible, as regards chronology, "is, as it now stands, no more a history than it is a science."—(KNOX ON RACE, p. 384).

"The Holy Scripture," says a well-known writer, "can neither lie nor err, but it needs to be interpreted; for were we to insist upon the literal sense of the words we should find not only contradictions, but heresies and blasphemies; we should have to give to God hands, feet, ears, to suppose him subject to like passions with men—to anger, remorse, hatred; and, again, to hold that he forgets the past and is ignorant of the future.

"There is one God supreme over all gods, diviner than mortals,
Whose form is not like unto man's, and as unlike his nature;
But vain mortals imagine that gods like themselves are begotten,
With human sensations, and voice, and corporeal members;
So, if oxen or lions had hands, and could work in man's fashion,
And trace out with chisel or brush their conception of Godhead,
Then would horses depict gods like horses, and oxen like oxen,
Each kind the divine with its own form and nature endowing."

—XENOPHANES of Colophon [six centuries B.C.], "Supernatural Religion."—Vol. I. p. 76.

Inasmuch as the Bible constantly requires interpretation to explain how very different the true sense of the words is from their apparent signification, it appears to me that it should be quoted in scientific discussions only as the last resort. In truth, Holy Scripture and Nature both come from the Divine Word, the one being the dictation of God, while the other is the executor of His decrees; but it was fitting that, in the Scriptures, the language should be adapted to the people's understandings in many things where the appearance differs widely from the reality. Nature, on the other hand, is inexorable and immutable; she is not at all concerned whether the hidden reasons and means through which she works are or are not intelligible to man, because she never oversteps the limit of the laws imposed upon her. Hence it appears that when we have to do with natural effects brought under our eyes by the experience of our senses, or deduced from absolute demonstrations, these can in no wise be called in question on the strength of Scripture texts that are susceptible of a thousand different interpretations, for the words of Scripture are not so strictly limited in their significance as the phenomena of Nature. . . . . I therefore think it would be wise to forbid persons from using texts of Holy Scripture, and from forcing them, as it were, to support as true certain propositions in natural science, whereof the contrary may to-morrow be demonstrated by the senses, or by mathematical reasoning."

"There is, indeed, no ground for impeaching the general sincerity of religious people who are alarmed at the advancement of Science, and denounce it as subversive of faith. Their difficulty is simply that of narrowness and ignorance, inspired by a fanatical earnestness. Their ignorance retards the progress of intellect, countenances crime,—nay, to a State, is the greatest of criminals. Ignorance is the sole spring of evil—the true antidote is knowledge. If we consummate in knowledge, we should be perfect and good. Atheism has now come to be a familiar and stereotyped charge against men of science, both on the part of the pulpit and the religious press. Not that they accuse all scientific men of Atheism, but they allege this to be the tendency of scientific thought, and the outcome of scientific philosophy. It matters nothing that this imputation is denied; it matters nothing that scientific men claim that their studies lead them to higher and more worthy conceptions of the Divine power, manifested through the order of Nature, than the conceptions offered by theology. It is enough that they disagree with current notions upon this subject, and any difference of view is here held as Atheism.

In this, as we have said, the theologians may be honest, but they are narrow and bigoted;[1] and it is surprising that they cannot see, that in arraigning scientific thinkers for Atheism they are simply doing what stupid fanatics the world over are always doing when ideas of the Deity different from their own are maintained. And it is the more surprising that Christian teachers should indulge in this intolerant practice, when it is remembered that their own faith was blackened with this opprobrium at its first promulgation." In a very able article by Professor Zeller, of Berlin, on "The Contest of Heathenism with Christianity," this interesting subject is taken up, and the writer remarks upon it as follows:—

"To the heathen nations the Christians were, in the first place, Atheists; for in every age this name has been given

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(1) Totius negotii caput ac fontem ignorant, divinant ac delirant omnes."

"All ignore, guess, and rave about the head and fountain of the whole question at issue."

to those who did not agree with the prevailing conceptions of the Deity,—not only when they denied his existence but when they sought to instil a more just and worthy idea of God. 'Down with the Atheists!' This was the war-cry of the heathen mob against the Christians. It was with this cry, for example, that in A.D. 156 the venerable Bishop Polycarp was received on the race-course at Smyrna. The only gods the people knew anything about—whose temples they frequented, whose statues they worshipped, to whom they offered sacrifices and prayers—were denied by the Christians; they were declared to be the inventions of man's superstition, and sometimes to be evil spirits,—devils. Can we wonder that the people who were still devoted to these gods felt the attack upon them to be an attack upon themselves, their most sacred and cherished possessions,—that they were the more deeply incensed at it the more seriously they feared by toleration of it to lose the favor of the gods on whom their welfare depended? The reproach of Atheism was, therefore, the most dangerous that could be brought against the Christians. In that 'Down with the Atheists!' with which the yells of the mob greeted Polycarp at Smyrna was included the sentence of death, which they at once proceeded to execute by preparing the stake. And the cry was followed in numberless cases by the same results. If any public misfortune, any alarming event, occurred which seemed to indicate the displeasure of the gods—a pestilence, a dearth, a flood, an eclipse, an earthquake,—superstition was always ready to make the Christians responsible for it, as enemies of the gods; the exclamation was sure to be heard, 'The Christians to the lions!' Both the educated and uneducated have always attributed every other wickedness to the enemies of the gods, and so it was with the Christians. Being Atheists they were also criminals, and all manner of horrible stories were told of them. It was not enough that they were said to worship a god with the head of an ass, which we see represented to this day in a caricature of that period, the well-known mock crucifix in the Kircher Museum at Rome; it was said, also, that in their secret assemblies they practised all sorts of horrors, killed and devoured children, and gave themselves up to frightful excesses. Scarcely any evils were attributed to the Jews in the middle ages by Christian fanatics which had not been before attributed to the Christians by heathen superstition."

"It would be well if our theologians would remember these things when tempted to deal out their maledictions upon scientific men as propagators of Atheism. For the history of their own faith attests that religious ideas are a growth, and that they pass from lower states to higher unfoldings through processes of inevitable suffering. It was undoubtedly a great step of progress from Polytheism to Monotheism, as it was certainly a most painful transition to lose the idea of a social hierarchy of human or superhuman immortals constantly mixed up with human affairs and the working of Nature, and to substitute the idea of a solitary divine personality, related to mankind chiefly through a special theological scheme. But this was neither the final step in the advancement of the human mind towards the highest conception of the Deity, nor the last experience of disquiet and grief at sundering the ties of old religious associations. But if this be a great normal process in the development of the religious feeling and aspiration of humanity, why should the Christians of to-day adopt the bigoted tactics of heathenism, first applied to themselves, to use against those who would still further ennoble and purify the ideal of the Divinity? It cannot be rationally questioned that the world has come to another important stage in this line of its progression. The knowledge of the Universe, its action, its harmony, its unity, its boundlessness, and grandeur, is comparatively a recent thing; and is it to be for a moment supposed that so vast a revolution as this is to be without effect upon our conceptions of its Divine control? Is it rational to expect that the man of developed intellect, whose life is spent in the allabsorbing study of that mighty and ever-expanding system of truth that is embodied in the method of Nature, will form the same idea of God as the ignorant blockhead who knows and cares nothing for these things, who is incapable of reflection or insight, and who passively accepts the narrow notions upon this subject that other people put into his head? As regards the Divine government of the world, two such contrasted minds can hardly have anything in common. "As a man thinketh, so is he;" and as a man is, so will he think. If he is ignorant and stupid, his contemplation of divine things will reflect his own low limitations. He will cling to a grovelling anthropomorphism, and conceive of the Deity as a man like himself, only greater and more powerful, and as chiefly interested in the things that he is interested in. If he delights in the pious excitement of "revivals," he will think of the Almighty as the patron of revivals and love-feasts. It is superfluous to say that men, who look upon the Universe as Science has disclosed it, cannot much sympathize with this view of the Deity, and all that it implies. The profound student of Science will rise to a more spiritualized and abstract ideal of the Divine nature, or will be so oppressed with a consciousness of the Infinity as to reverently refrain from all attempts to grasp, and formulate, and limit the nature of that which is "past finding out," which is unspeakable and unthinkable.

Religious feeling may be awakened in both those minds; but its inspirations and its accompaniments will be as wide asunder as the poles. Our religious teachers ought in these days to have liberality enough to recognize this serious fact, and, remembering that human nature is religiously progressive, as well as progressive in its other capacities, should abstain from copying the bad examples of narrow-minded heathens who, thousands of years ago, treated Christians in the same manner as Christians now treat men of Science."—(Soc. Science).

I now, in the name of Science, address thinking men, and say, let us reverently commune with Nature. Let us try to raise our eyes from the varying phenomena of the world to the solemn grandeur of that silent, that imperishable, reign of law that governs all those changes; let each of us earnestly address to himself the remonstrance of "The Minstrel:"

> "Oh! how can'st thou renounce the boundless store
> Of charms that Nature to her votary yields,
> The warbling woodland, the resounding shore,
> The gloom of groves, the garniture of fields,
> All that the genial ray of morning gilds,
> And all that echoes to the song of even,
> All that the mountain's sheltering bosom shields,
> And all the dread magnificence of heaven—
> Oh! how can'st thou renounce, and hope to be forgiven?"

Shall a man who stands forth to vindicate the majesty of the laws of Nature be blamable in your sight? Rather shall you not with him be overwhelmed with a conception so stupendous? And yet let us not forget that these eternal laws of Nature are only the passing thoughts of God.

The opponents of scientific men resemble the "Rhetorician," spoken of by Plato, who makes Socrates tell Gorgias that he, "Rhetorician," "does not profess to teach Courts of Justice and other public Assemblies respecting things just and unjust," but only to produce belief or opposition to scientific research.

I now quote a great poet, who expresses himself very aptly regarding bigots and hypocrites in religious and scientific matters.

> "With all his conscience and one eye askew,
> So false he partly took himself for true;

Whose pious talk, when most his heart was dry,
Made wet the crafty crow's foot round his eye;
Who never naming God except for gain,
So never took that useful name in vain;
Made him his cat's paw, and the Cross his tool,
And Christ the bait to trap his dupe and fool;
Nor deeds of gift, but gifts of grace, he forged,
And, snake-like, slimed his victim ere he gorged;
And oft at Bible-meetings, o'er the rest
Arising, did his holy, oily best."

During the 8th Century we find Science was cultivated with a zest worthier of better times.

Mahomet says, "Seek knowledge, were it even to China. It is permitted to the Moslems to possess all the Sciences." The library founded by the conqueror of Constantinople bears its paraphrase, as an inscription:—"The study of the Sciences is a divine precept for true Believers."

The MS. of the Kaoudat-Kou-bilik, or "Science of Government" (A.D. 1069), says, "Whoever possesses wisdom, possesses the foundation of all things."

As I have formerly asserted that man's belief in the invisible, or sects, is regulated by his knowledge or enlightenment, so to that extent men have believed in the invisible, personal wills,—to that extent have they adapted their conduct thereto, in a similar manner that they have corelated their actions to visible external personalities. These invisible non-entities have been supposed to have likes and dislikes, and require propitiation and deference, which at once convinces us that they are material beings moved by like passions and conceit, the same as we poor mortals. Tertullian thinks "the soul even has the human form, the same as its body, only it is delicate, clear, and ætherial." These invisibles have been regarded as taking an interest in human affairs, and in the conduct of individuals,—to be capable of love, hatred, vindictiveness, and susceptible of persuasion; and these characteristics or properties have, for the most part, depended upon the intellectual calibre and mental development of those persons with whom those attributes sprung up. But if we think for one moment, we shall find that those god-like properties all sprung from, and are the offspring of, atomic [m] brain changes, or visible matter. The non-recognition of such myths by any one would naturally stir up displeasure and hatred amongst persons of small calibre of mind. This view would render the defence of their invisible Being or Ruler urgent. Grave and serious persons would view with alarm any innovations which would do away with the groundwork of good conduct. They would think, without a law-giver, without a system of rewards and punishments, where would be the majesty and the controlling force of moral law; and where would be the incentives to a moral or virtuous life, and where the deterrent to vice? Such has been the view and animus against the advances of Science. Science, however, knows no imaginary portal save that which is the simple advance of inevitable facts.

We often hear it affirmed that our age is becoming more and more irreligious, and that men wantonly reject sacred things of which their ancestors approved. But I think we may profitably inquire whether very much of this is not due to the profound changes that are taking place in our conceptions of the Supreme Being? Things and acts which at one time men attributed to him without hesitation they can attribute to him no more. They have learned to demand of every dogma, "Is it derogatory to the awful majesty of God?"

Religion, as opposed to Science, believes in Miracles, or immaterial power. Science believes only in

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(m) "Nihil est aliud magnum quam multa minuta."—VET. AUCT.
"Nor is there anything that hath so great a power as the aggregate of small things."

facts, or the natural laws, hence a conflict will ever wage between the two. Theology says "Cæsar dixit ita est." Science speaks in a thundering voice, thus: "It is not because the holy saint this, or the learned saint that, says it, or you believe it: no, it says, prove so and so to be a fact, then disbelieve me if you can, refute me if you are able. For Science, the Volume of Inspiration is the Book of Nature, of which the open scroll is ever spread before our eyes; infinite in extent, Kalpaic in duration, man's ambition or fanaticism can never add to or diminish therefrom. On Earth it is illustrated by grandeur and beauty; in heaven it is enscrolled in shining characters of suns and worlds.

Religion, as viewed by the majority of sects, as being of a set of dogma handed down from hoary antiquity, is of no value. If its antiquity should be respected, surely Buddhism has the superior warrant in this respect. It is valueless in our emotional nature; it is no item in our environments, to which it is necessary to adapt ourselves. Its interest to ourselves or Science is *nil.* The only value to us is when it takes on a personality, or an idea of it: then, and only then, can we measure and appreciate its perfection and properties.

(n) Scientific men are a kind of "*enfants terribles* in the sacred household of theology, and as such are avoided by the "sacred priesthood," for they, being of an enquiring mind, ask for an answer for the "faith which the Church teaches." He prefers rather to be classed with Epicurus, when he says, "Not he is godless who rejects the gods of the crowd, but rather he who accepts them."

(n) "Titinius Capito is to rehearse. He is a man of an excellent disposition, and to be numbered among the chief ornaments of his age. He cultivates literature, he loves men of learning, &c."—Lord Orrery's "Pliny."

Vogt calls the cry of the Church against Science and Darwinism as the "Wail of the Moralists" ("Das Wehgeschreider Moralisten"), and all he thinks it necessary to reply to them is,

> "Last sie bellen, bis sie ausgebellt haben,"
> "Let them bark till they are tired."

The abuse of sectaries against scientific researches, "is the blind authority beating with his staff the child that might have led him."

> They "wrap NONSENSE round
> In pomp and darkness, till it seems profound;
> Playon the hopes, the terrors of mankind,
> With changeful skill; . . . . . .
> While Reason, like a grave-faced mummy, stands
> With her arms swathed in hieroglyphic bands."

With the theologian a great national pride and idol must be set up, and they wish us to be compelled to bow down and worship it, under penalty of being thrown into a burning fiery furnace of offended national pride.

"There is an Atheism which is unto death: there is another Atheism which is the very life-blood of all true faith. It is the power of giving up what, in our best and most honest moments, we know to be no longer true; it is the readiness to replace the less perfect, however dear and sacred it may have been to us, by the more perfect, however much it may be detested as yet by others. It is the true self-surrender, the true self-sacrifice, the greatest trust in truth, the truest faith. Without that Atheism, no new religion, no reform, no resuscitation, would ever be possible; without that Atheism no new life is possible for any one of us."—(Dean STANLEY).

Dean Stanley has well spoken of that Atheism "which is the very life-blood of all true faith." That is the Atheism of Science. In regard to Atheism and Scepticism, I may say, "Christian men are proved by their writings to have their hours of weakness and doubt, as well as their hours of strength and conviction; and men like myself share, in their own way, these variations of mood and tense." Nor can any scientific person complain of revilings levelled at them: these very revilings, as can be readily proved, are being used without scruple by professing Christians towards each other."—(TYNDALL).

Scientific men may well hang aloof from churches and parties, in fact private clubs, each of which has its own ballot-box of salvation filled in with a multitude of traditional dogmas, which can safely be excluded from the conception of true religion. They consider, as St. Hilary, Bp. of Poictiers, said, that, "it is a thing equally deplorable and dangerous that there are as many doctrines as inclinations, and as many sources of blasphemy as there are faults among us, because we make creeds arbitrarily, and explain them as arbitrarily. Every year, nay, every moon, we make new creeds to describe invisible mysteries; we repent for what we have done; we defend those who repent; we anathematize those whom we defend; we condemn either the doctrines of others in ourselves, or our own in that of others; and, reciprocally tearing each other to pieces, we have been the cause of each other's ruin."

Erasums exclaimed, "If Christ does not deliver his people from this multiform ecclesiastical tyranny, the tyranny of the Turks will become less intolerable."

The great scientific research now going on has not only roused the energy and activity of friends, but especially so the ire of bigoted theologians,[o] who raise

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(o) Sir E. Hyde, afterwards Lord Clarendon, in the reign of Charles II, gave utterance to the following words, and, although above 200 years have passed away, they are as true now as then:—"Of all men who can read and write, the Clergy are the least qualified to interfere in worldly affairs."

"Parsons should weep, not teach."

—ST. JEROME ON MONKS.

the old war-whoop of the "Bible in danger," and "God made man in his own image, although, forsooth, the said inspired Book has lately been amended and copyrighted by men of like passions and infirmities as ourselves, who may and have erred in matters of faith."

This same cry, 300 years ago, was raised when they declared the Copernican system a pernicious heresy, because Joshua commanded the Sun and Moon to stand still; they even denounce geologists as heretics,(p) sceptics, and infidels, because, forsooth, they don't wish to accept the Jewish doctrine, that God created the Heavens and the Earth in six days, and rested on the seventh. Men of Science are at antagonism with Theologians, because they (scientific men) build up their fabric of thought on the basis of their own Intellectual and Moral Intuitions, and find it impossible to conform to, much less to swallow, "the everlasting damnation of all those who are unable to accept a set of *Dogma* or *Doctrines* quite irreconcilable with any conception they can form, either of a righteous Creator or a loving Father. The Baptismal rite, or the Atoning sacrifice of a Divinity, cannot be conceived in their minds as the conditions on which an innocent baby is saved from eternal damnation."

Dean Stanley, when in America, and addressing public meetings on the Inspiration of the Bible, says, "The crude notions which prevailed twenty years ago on the subject of Bible inspiration have been so completely abandoned, as to be hardly anywhere maintained by theological scholars. . . . . The doctrine of the Atonement will never again appear in the crude form common both in Protestant and Catholic churches in former times. A more merciful view of future punishment, and of a hope of a universal restitution, have been gradually advancing, and the darker view gradually receding. . . . . The question of miracles has reached this point—that no one would now make them the chief or sole basis of the evidence of religious truth. . . . . I am persuaded that what is called Liberal Theology is the backbone of the Church of England, and will be found to be the backbone of its daughter Church in America."

(p) "Virtuous and vicious every man will be—
Few in the extreme, but all in the degree;
The rogue and fool, by fits, are fair and wise,
And e'en the best, by fits, what they despise!"

The power and sway of dogmatic theology, thanks to the missionaries of Science, are on the decline.

> "The monstrous blasphemy of creeds
> Which represents an angry God,
> Who tempts man sorely through his needs,
> And meets his feelings with a rod—
> Eternal wrath, through blood appeased,
> The curse of God, salvation's plan,
> Are nightmare visions, which have seized
> The stumbling consciousness of man.
>
> . . . . . .
>
> The pure fresh impulse of to-day,
> Which thrills within the human heart,
> As time-worn errors pass away,
> Fresh life and vigor shall impart."—Lizzie Doten.

Its assumptions, that creeds and books are authority more sacred than the truths of the soul and of Nature, that belief in dogmas is the only means of salvation, and that there can be no religious life outside its narrow limits, are to die as the soul asserts itself, and as rational knowledge increases.

When I consider the position of Science and Religion, I may candidly ask which of these two have earned God's blessing, the systematisers or theologians who have gyrated in contradictory expositions, or the men of science who have proceeded ever in triumphant progress, pressing forward irresistably from fruitful discovery to fruitful discovery, "springing from crystal step to crystal step?"

By Science I mean demonstrative knowledge respecting the laws and phenomena of the Universe; by Religion I mean established facts respecting the relation of God to man. To assert that one can be hostile [q] to the other is to assert that the God of the Universe can be an enemy to the God of the conscience, or that the laws which he has written on the mighty pages of his macrocosm can give the lie to those which he has inscribed on the heart of humanity, and on the tablets of the moral law. A spurious science, indeed, and a false theology, may often clash their opposing self-complacencies, and truth, in the struggle, may be retarded for centuries. But "*Veritas laborat sæpe, extinguitur nunquam.*" On the one side, let there be but a single thinker striking out some new truth in his solitary cell; and on the other side let there be all the banded forces of prerogative and prejudice—"let kings fight against it with their armies, let priests denounce, let synods anathematise, let bishops excommunicate, yet in spite of the evidence of men's senses, in spite of the cruelty of their powers, in spite of the tyranny of their leaders, in spite of the inveteracy of their beliefs, *Magna est veritas, et* PRÆVALEBIT."

Now truth only—"fearless of results, indifferent to consequences, established by infinite, humble, self-abnegating toil—is the very domain of Science; and the belief in it, the love of it, and the inquiry after it, furnish mankind with their best and noblest aims. Theologians have delighted to contrast faith and reason, to monopolise the former, and to leave the latter, in all its supposed aberrations, to their opponents. The

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(q) "The Church should learn the error of her ways in not recognizing her two companions, Art and Science, in the struggle against the lower life, and should renounce that part of her doctrine which conflicts with their ideals. The idea of development must be applied to religion as to everything else, and the conception of prophecy be revived in the modern form of a philosophy of history."

antithesis should be rejected as mutually injurious, and "altogether unholy." All theology[r] worthy of the name *must* appeal to reason for the very grounds of its acceptance; and all true science soars upon the wings of the very loftiest faith."

Unaided, and with no weapon save the prerogative of Reason, Science has many a time torn up and scattered to the winds the dearest prejudice of divines, nullified their haughtiest claims, reversed their most positive assertions, erected towers of adamant amid their ruined walls of untempered mortar. The path of Science, no less than that of history, is strewn with the wrecks of their defeated dogmas, and covered with the *dèbris* of their causeless threats.

But if we be asked what *theology* has done, what shall we answer? For a thousand years Theology had it all her own way; all learning did homage to her, and all authorities supported her. Theology had to herself the undisputed dominion of the world; and what came of it? Take any history of doctrine, be it Haag or Hagenbach, any history of the Church, be it Giesler or Neander, Milman or Gibbon, it will plainly point out that Theology has always been the oppressor and opposer of religious liberty.[s]

If Theologians and Heads of Ecclesiastical Systems would at once bring themselves to look upon Nature,

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(r) In reviewing "Natural Religion" by the author of "Ecce Homo," he groups together, with all the great idealisms—art, science, culture—and claims that these are natural religion. According to this author, everything that takes us beyond and above our selfish aims is religion. The opposition between science and theology becomes vain and of no effect—both are forms of religion. The indifference of art for the conventions is but another form of the struggle against worldliness, and here, again, art and religion join hands.

(s) "The Eternal, and the Infinite, and the All-embracing has been represented as the head of the clerical interest, as a sort of clergyman, as a sort of schoolmaster, as a sort of philanthropist."—"NATURAL RELIGION," by author of "Ecce Homo."

or the Material Universe, as the embodiment of Divine Thought, and at the scientific study of Nature as the honest endeavour to discover and apprehend that Thought, they will see that it is their paramount duty, instead of holding themselves aloof from Science, or stopping short in the search for scientific Truth, whenever it points towards results which seem in discordance with their preformed conceptions, to apply themselves assiduously and honestly to the study of it as a Revelation of the Mind and Will of the Deity, and look to Nature as a united existence, which is certainly not less authoritative than that which He has made to us through the recorded thoughts of religiously inspired men, and which is fitted, in many cases, to afford its true interpretation. They will then perceive that although, if God be *outside* the *Physical Universe,* those extended views of its vastness which Science opens around us removes Him further and further from us, yet, as He fills all space, and is embodied in it, every such extension enlarges our ideas of His being. Mr. Martineau has nobly said:—"What, indeed, have we found by moving out along all radii into the Infinite? That the whole is woven together in one sublime tissue of intellectual relations, geometrical and physical—the realized original, of which all our Science is but the partial copy." (t)

Theological dogmatists have said a great deal of the law of God,—not law universal and inherent, but the arbitrary decrees of an Oriental Sovereign, written in a book.[u] Criticism shows that there is no reasonable certainty as to the age, or authorship, or compilation of this volume, and that it is contradictory as to facts and morals; and so men doubt both book and decrees. They have told us of a Being, sitting on a distant throne, building worlds as a carpenter builds houses, and enacting an occasional miracle-play, at the expense of natural law, to show his power, or reward his friends, or punish his enemies. In our day the great lesson is, that the Reign of Law is everywhere, in and through all things, and so this old conception of a God, outside of the world and regardless of the eternal process of natural law, is dying out.

(t) Imagine any educated person adhering to the theological school, and calmly swallowing the doctrine that our national welfare will be endangered if there is not an enforced repetition in all churches of the dogmas that Father, Son, and Holy Ghost are each of them Almighty; that yet there are not three Almighties, but one Almighty; that one of these Almighties died on the Cross and descended into Hell to pacify another of them; and that whosoever does not believe this, "without doubt shall perish everlastingly."

We could very well agree with Epicurus when he considered the gods (God) as eternal and immortal beings, whose blessedness excluded every thought of care or occupation of any kind. Nature pursues her course in accordance with everlasting laws, the gods never interfering. They haunt

> "The lucid interspace of world and world
> Where never creeps a cloud or moves a wind,
> Nor ever falls the least white star of snow,
> Nor ever lowest roll of thunder moans,
> Nor sound of human sorrow mounts to mar
> Their sacred everlasting calm."

We have had glowing pictures of a heaven for the few, narrow, exclusive, and selfish, and of a place of eternal and hopeless torture and despair for the many. Death has been "the king of terrors," the grave "a bourne from whence no traveller returns," the future

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(u) Think of the Christian Bible dedicated to an English Sovereign who was, as Bissett describes him (King James), "in every relation of life in which he is viewed . . . . equally an object of aversion or contempt," as follows:—

> "Great and manifold were the blessings, most dread Sovereign, which Almighty God, the Father of all mercies, bestowed upon us, the people of England, when first He sent Your Majesty's Royal Person to rule and reign over us."

Think of such a dedication of the Bible by a Christian nation to such a man.—N. C.

life a realm shut off from us, and of which we could have no reliable knowledge. The Rev. D. Watson, a Scotch Presbyterian clergyman, in a discourse to the Young Men's Christian Association of Paisley, said:

"The great, the wise, the mighty are not with us. . . The best thought, the widest knowledge, and the deepest philosophy have discarded our Church. They detest what they call the inhumanities of our creed.[v] . . . . They step out into speculative Atheism, for they can breathe freer there. . . . . They are instinctively religious, despite their renunciation of our theological creed. They are big with a faith in the ultimate salvation of man,—a faith that inspires them to toil, and shames our whining cant. And yet these men—the master-minds and imperial leaders among men—the Comtes, the Carlyles, the Gœthes, the Emersons, the Humboldts, the Tyndalls, and Huxleys, if you will,—are called Atheists by us, are pilloried in our Presbyterian orthodoxy as heretics before God and man. Why are such as these outside the pale of the Christian Church? Not that they are unfit—we own that,—but we are unworthy of them, and by the mob force of our ignorant numbers have driven them out. They shun us because of our ignorant misconceptions and persistent misrepresentations of heaven, of man, and God."

"I looked—aside the dust-cloud rolled—
The Waster seemed the Builder, too;
Up springing from the ruin'd Old,
I saw the New.
"'Twas but the ruin of the bad—
The wasting of the wrong and ill;
Whate'er of good the old time had
Was living still."

There is no profession of religion more offensive than that which, under an assumption of superior

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(v) "I say that man believes in a God who feels himself in the presence of a Power which is not himself, and is immeasurably above himself,—a Power in the contemplation of which he is absorbed, in the knowledge of which he finds safety and happiness."—"NATURAL RELIGION," by the author of "Ecce Homo."

piety, attempts to vilify the honest and sincere convictions of others; the stand aside because "I am holier than thou art" is, in general, as void of reality as it is wanting in Christian humility and charity. If religion means belief in certain ritualistic forms, science and religion may often be in conflict. And no man who has subscribed to creeds and formularies, whether in theology or philosophy, can be an unbiassed investigator of the truth, or an unprejudiced judge of the opinions of others. His sworn preconceptions and adherence to his sect or party warp his discernment, and engender intolerance to the honest convictions of other inquirers. It is time theologians are plainly told that the scepticism and infidelity—if scepticism and infidelity there be—lie all on their own side. No scepticism is so offensive as that which doubts the facts of honest and careful observation, and no infidelity so extremely gross as that which disbelieves the deductions of competent and unbiassed judgments.

There can be no reverence more sacred than that which springs from a knowledge of the Book of Nature written with the finger of God in stone; and no religion more sincere than that which originates from an enlightened understanding of the laws and working of the "Ancient of Days." The more intimate our acquaintance with the handiwork of God the stronger will be our convictions of the goodness, wisdom, and power of the "Omniscient One,"

"Who sees with equal eye, as God of all,
A hero perish, or a sparrow fall,—
Atoms and systems into ruin hurl'd,
And then a bubble bursts, and then a world"

Narrow-minded theologians fear the study of Science may lead to imperfections being found in the Mosaic Cosmogony; they consider those "lights of thought," as was said of Mr. J. S. Mill (*Church Herald*, May 14, 1873), that their "death is no loss to anybody, for he was a rank but amiable infidel, and a most dangerous person," and as was written of Tyndall, *vide* Spencer on "Studies of Sociology," page 439, "You have endeavoured to deprive Mankind of its only consolation in life, and its only hope in death," without offering anything instead but the 'dry light' of your molecules and atoms."

I consider it an injunction, morally and physically, to investigate and find out the relations and duties which God has evidently established between himself and the rest of Creation.

If there be any irreverence or infidelity in dealing with Science and its revelations, that irreverence rests with those who would circumscribe the range of man's reason, the prerogative of God himself, and prevent us by unworthy clamour from arriving at some conception, however faint, of those laws with which the Creator has chosen to sustain the phenomena of our globe.

Holy beliefs are those founded on informed reason; all besides are really nothing better than superstitions and mechanical formality; and, finally, it is useless, when the cause and effect of Nature's works and man's origin are under investigation, for certain minds to work themselves into a frenzy of "orthodoxy," to savagely besmear themselves with theological war-paint, decorate their heads with the black flag, and, agonizing like, raise the old war-whoop of "the Bible in danger." This war-whoop is launched forth with all the intolerance and bigotry which graced the reigns of the Tudor dynasty.

Science has always been persecuted with the *odium-theologicum* from the time of Galileo to the present era. But being aware that Churches and Theological Schools which proscribe studies in Science are men of like passions with ourselves, "may err, and sometimes have erred," "I will therefore throw aside the mystifying subtleties of Fathers, Councils, and Hierarchies, and the encumbering edicts of soldier kings and churchly decretals.”

To those assailants who would “crib, cabin, and confine” our thoughts, and compel genuflexions to obsolete and antiquated customs, I owe no explanation; to the craft of disingenuous criticism I offer no reply; to the bolt of the bigot, and the “shaft of the shrinemaker I scarce condescend the opposition of a smile.” If the battle must be fought against prejudices and preconceptions, so mote it be, for the warfare will the sooner terminate, and the sooner will Science give unmistakable utterance, no uncertain sound, to its convictions, and hurl back upon its opponents the unworthy weapons of their unworthy attacks.

KINDRED AND DESCENT.

THE interest with which the modern theory of kindred and descent has been received does not proceed alone from friends, but also from antagonists, who perceive more or less distinctly the danger with which the new doctrines threaten their standpoint view of miracle, and fear a dislike of inquiry, which ever attends those who profess a religion which is believed or known to be weak. The Divines who have studied only one form of religion resemble students who have studied only one language, and the words of the poet apply as aptly in religious matters as in a knowledge of tongues,

> "He who knows only one knows none."

So with such Divines every science which does not accord with their standpoint view of knowledge and science is cried down as heresy, schism, or infidelity; whilst at the same time there is nothing in it contradictory to the revealed Word of God. Dr. Buckland says "that a science which unfolds such abundant evidence of the Being and attributes of God cannot reasonably be received in any other light than as the efficient auxiliary and handmaid of religion." Scientific truth rightly understood, which illustrates the Divine character, or government, is strictly religious truth. Scientific truth is but another name for the laws of Nature, and a law of Nature is merely the uniform mode in which the Deity operates in the created Universe, for the Creator permeates all matter, which matter is a living force evolving beings and organic bodies of endless varieties and ever-changing forms. Science, then, is only seen as a history of the Divine operation in matter and mind. I feel convinced that he who possesses the greatest knowledge of the laws of Nature and Science approaches nearer to the Omnipotent *Jahweh*, or Allah—for from him all Knowledge proceeds—than those who pass their lives in grovelling ignorance, only obeying the dictates of their passions and appetite.

Every Theologian, in opposing the Doctrine of Descent at the present day, imagines man only to appear created shaven and armed with a book on etiquette to guide him into polite society,—for such accords with their views when they disbelieve progression in the human animal, or a gradual transformation of species; and yet they preach up the doctrine that the negro or Tasmanian native, mentally and morally, can only attain an intellectual status equal with the white race after many generations of culture.

If we are to throw aside the *Doctrine of Descent* and accept as many species as were created, how is a created species to be distinguished from one produced by the intermixture of several others, as in the case of tame pigeons representing so many varieties, yet all derived from the rock-pigeon? And then, again, the unity of the human race, which, on the doctrine of the Bible, "God hath made of one blood, all nations of men for to dwell on all the face of the Earth."

Professor Janet declares that, notwithstanding the numerous objections we have raised against Mr. Darwin's theory, we do not declare ourselves hostile to a system of which zoologists are the only competent judges; we are neither for nor against the transmutation of species, neither for nor against the principle of natural selection.

Dr. Peabody, who delivered the funeral oration over Professor Agassiz's remains, says, "I could admit them" (Darwin's theories) "without parting with one iota of my faith in God and Christ."

M. Mivart admits that natural selection must have been one of the conditions of the animals below man, and that even in his case it has been supplemented by some other cause.

Huxley, in reply to M. Flourens on unconscious selection, says, "The winds and waves of the Bay of Biscay have not much consciousness, and yet they have, with great care, selected from an infinity of masses of silex, all grains of sand below a certain size, and have heaped them by themselves over a great area. . . . . A frosty night selects hardy plants in a plantation from among the tender ones, as effectually as if the intelligence of the gardener had been operative in cutting the weaker ones down."

Lucretius, nearly a century before Christ, gave us "the survival of the fittest" in his Latin verse:

> "The seeds of bodies from eternal strove,
> And used by stroke, or their own weight, to move,
> All sorts of union tried, all sorts of blows,
> To see if any way would things compose;
> And so, no wonder they at last were hurled
> Into the decent order of the world,—
> And still such motions, still such ways pursue,
> As may supply decaying things by new.
> But more, some kinds must other kinds replace:
> THEY COULD NOT ALL PRESERVE THEIR FEEBLE RACE;
> FOR THESE WE SEE REMAIN AND BEAR THEIR YOUNG,
> CRAFT, STRENGTH, AND SWIFTNESS HAS PRESERVED SO LONG."

Huxley says, "that when he first read Mr. Darwin's book, that which struck him most forcibly was the conviction that teleology (final causes), as commonly understood, had received its death-blow at Mr. Darwin's hands. For the final cause argument ran thus, "An organ is precisely fitted to perform a function or purpose; therefore it was specially constructed to perform that function. In Paley's famous illustration, the adaptation of all the parts of a watch to the function or purpose of showing the time, is held to be evidence that the watch was specially contrived to that end—on the ground that the only cause we know of competent to produce such an effect as a watch which shall keep time is a contriving intelligence adapting the means directly to that end."

If ethnology does not distinctly point to the derivation of all nations from one, it is partly owing to the imperfection of ancient records, and to the spirit of rivalry and pride which led each separate race to imagine for itself an independent origin, as well as to the fact that, hitherto, men of science have never been agreed as to the nature of the truth to be looked for underlying the mass of traditional fables accumulated in every ancient nation.

To fall back upon the Creation is to lose oneself in the Infinite and the Impalpable. This will never enable us to understand anything; and definitions which rest on an inexplicable foundation, or a mystery, ought to be proscribed from Science for evermore.

Science is the investigation of facts and phenomena recognizable by the senses, and of causes which have brought them into existence. Dr. Lionel Beale (London) thinks that all evidence of religion not founded on Nature, and perceived by the senses, amounts to nothing, and Religion, as generally practised, is nothing but certain fixed rules and customs handed down from hoary antiquity "by faith and ages made Divine," being the remnants of feudal despotism, to which every knee must bow, or else suffer themselves to be branded as outlaws of respectable society, to prove the doctrine orthodox. Huxley says, "Let him (man) not imagine that he is, or can be, both a true son of the Church and a loyal soldier of Science." And, on the other hand, if the blind acceptance of authority appears to him, in its true colors, as mere private judgments *in excelsis*, and if he has courage to stand alone face to face with the abyss of the Eternal and Unknowable, let him be content, once for all, not only to give up the good things promised by Infallibility, but even to bear the bad things which it prophecies, content to follow reason and fact in singleness and honesty of purpose, wherever they may lead, in the sure faith that a hell of honest men will be to him more endurable than a paradise full of angelic frauds. Well might Lucretius exclaim "What crimes has it (*Religion*) not committed?" and what cruelties have been perpetrated in the name of Him who said "Love your enemies; blessed are the peacemakers; whatsoever ye would that men should do to you, do ye even so to them."

Well might the Saracens exclaim "See how these Christians love one another;" they sharpen their swords in the week-day, and fight it out on Sundays. For eighteen centuries nothing but bloodshed and cruelties have been perpetrated in the name of Christianity, and even at the present day, differences of religious opinions, and in the interpretation of the Bible, cause the inquirer after truth to be attacked with a malignity and fury that would have graced the age of Mary and Elizabeth, when Catholics put Protestants to death, and Protestants put Catholics to death, for the sake of Him who commanded mankind to *love one another.*

However, as the daylight of Knowledge daily increases so will we be able to realise the ancient writer's words, "Is there any old woman silly enough to fear the monsters of hell."

Mankind always from known history had a desire to worship something; thus instinct of worship was generated like all other instincts of the flesh. The faculty of man conceiving an existence of a God is only an extra endowment of man, but if that is a fact what about savages? Sir. J. Lubbock, in his "Prehistoric Times," says that the burial of arms, food, &c., does not denote an idea of immortality; and beliefs are always commensurate with our knowledge. If an immortal state is believed in, and, also a Deity, we may, as Swedenborg says, believe that "man or angel can never approach the Father and immediately worship him; for he is invisible, and, being invisible, can neither be thought of nor loved." Mivart asserts that without belief in a *personal* God there is no religion worthy of the name. Renan (*History des Lang. Semitiques*), in speaking of the Jews and the foundation of their faith, says, "they never would have reached the dogma of Divine Unity had they not found it in the most imperious instincts of their minds and hearts. In fact the desert was to them monotheist." St. Paul's Pantheism was the same, for he preached "one God and Father of all, who is above all, through all, and in all. Of Him, and through Him, and unto Him are all things."

This doctrine was first promulgated not by a celebrated Greek philosopher, but by a Bedouin Sheikh called Abraham, an astrologer, who taught this science for 20 years in Egypt. He belonged to Camarino, a town of Soothsayers in Babylonia, where he obtained his knowledge amongst the Maji of Chaldea.

"Were men," says Hume, "led into the apprehension of invisible intelligent power by contemplation of the works of Nature, they could never possibly entertain any conception but of one single being, who bestowed existence and order on this vast machine, and adjusted all its parts to one regular system." Referring to the condition of the heathen, who sees a God behind every natural event, thus peopling the world with thousands of beings whose caprices are incalculable. Lange shows the impossibility of any compromise between such notions and those of Science, which proceeds on the assumption of never-changing law and causality. "But," he continues, with characteristic penetration, "when the great thought of one God, acting as a unit upon the Universe, has been seized, the connexion of things in accordance with the law of cause and effect is not only thinkable, but it is a necessary consequence of the assumption. For when I see ten thousand wheels in motion, and know, or believe, that they are all driven by one, then I know that I have before me a mechanism the action of every part of which is determined by the plan of the whole. So much being assumed, it follows that I may investigate the structure of that machine, and the various motions of its parts. For the time being, therefore, this conception renders scientific action free." In other words, were a capricious God at the circumference of every wheel and at the end of every lever, the action of the machine would be incalculable by the methods of Science. But the action of all its parts being rigidly determined by their connexions and relations, and these being brought into play by a single self-acting driving wheel, then, though this last prime mover may elude me, I am still able to comprehend the machinery which it sets in motion. "We have here a conception of the relation of Nature to its Author which seems perfectly acceptable to some minds, but perfectly intolerable to others. Newton and Boyle lived and worked happily under the influence of this conception; Goethe rejected it with vehemence, and the same repugnance to accepting it is manifest in Carlyle."—(TYNDALL).

Hæckel says we have only two conflicting theories in the world, one monistic, the other dualistic; the former admits one substance, matter; the other admits two, matter and mind; monistic implies materialism—dualistic implies moral materialism, *i.e.*, the doctrine that sensual pleasure is the end of life; a doctrine much more frequently held by princely churchmen than by men of science. He maintains, however, that "all knowledge of Nature is one"—that the same eternal, immutable laws are active in the life of animals and plants, in the formation of crystals and the power of steam, in the whole spheres of biology, zoology, and botany. Man being the culminating point to which Creation tends, we cannot unravel the dark thread which veils the *beyond*, *all* of which is a *mystery*; however, if we *believe* a *soul* to be joined with our nature, then the soul would be that side of our nature which is in relation with the Infinite; but as those points are incapable of proof, we will therefore descend in the connecting chain, but not to that minute link to whom an atom is an infinite world. It does not concern us to trace living matter downwards in the scale of animal life till it vanish in the bare instinct of existence. The main point is, that such a scale exists, culminating in man, and, in its higher grades, approaching him in the kind, though not in the degree, of his various faculties. It is, however, a marvellous approximation, deal with the matter as we will.

The nearest approach to man, that is, of the whole species of *hominidæ*, is the *gorilla*, and here several links are lost which will ultimately be found. In fact, certain races of men exist which have few removes from the ape-class. Carl Vogt maintains that "microcephali and born[w] idiots present as perfect a series from man to ape as may be wished for, and by arrest of development, may approximate the ape:

(w) Regarding the idiot, according to the theological view we could exclaim—

> "Art thou great as Man can be;
> The same hand moulded him and thee,"

the formative law is the same for both; so we cannot deny the possibility, that just as man may, by arrest of development, sink down to the ape, so may the ape, by a progressive development,[x] approximate to man."

As there is Infinite space, so may there be Infinite matter to fill that space,—in which worlds roll far beyond the power of sight assisted by telescopes; and we may also have countless millions of organic beings too diminutive to be observed with a microscope, and even beyond the power of imagination.

Matter is not the mere naked, empty capacity which Philosophers have pictured her to be, but 'the universal mother who brings forth all things, as the fruit of her own womb.' We never can know anything of matter, save through the medium of its impressions on our senses, and these impressions are only derived from the force of which matter is the vehicle, or the force itself, and our cognizance of matter may be only a conception of our Intellect. Matter can only recognize material bodies and the effects and relation between such bodies. Matter has pre-existing germs, although finite yet infinite to our conception,* and its power is such as to evolve certain forms of life, then that power ceases, and secondary cause, such as

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(x) It was a felicitous thought of Descartes that we may represent a geometrical form in an algebraical equation, and by the proper consideration and discussion of such an expression, determine and delineate all the peculiarities of such a form,—that here it should become concave, there convex; here it should run out to infinity, there, have a cusp. The equation determines all the peculiarities of the form, and enables us to construct it. In like manner, all living and lifeless forms are related; an increase in the value of one condition carries development forward in one direction, an increase in the value of another condition determines development in another way, and these variations give rise in their succession to the whole organic series.

* Nature ever geometrizes and ever materializes. Every organism is the result of the development of a vesicle, under given conclusions,

natural surroundings, climate, food, and habits, make the rest of the beau-ideal.

The[y] circumstance and surroundings of a district favor the development of the species of animals and plants inhabiting the district, so that it would not be favorable for other species. Consul Manlius, when speaking of the Gauls, and wishing to excite the Romans to war against them, said, "Climate has done its work. The Gauls settled in Asia are an exotic race, and, like all exotics, have degenerated."

There is not, however, any permanence in existing things, for no two seasons are exactly alike: cold and heat, wet and dry, shelter and exposure, all vary year by year, whilst the slightest change may, and does, materially affect species of all classes as well as man, *e.g.*, the latter in catarrhs, influenza, pneumonia, pleurisy, neuralgia, and rheumatism. Every species must therefore be subject to occasional crowding out, producing starvation if it cannot adapt itself to the special order and changing circumstances. And if itself and offspring cannot adapt themselves to changes, they may temporarily be abundant, and soon then be lost altogether. If odd individuals, or plants, should change with the surroundings, then a new species will be the result. For the individuals who are strongest and best able to fight their way must succeed, and the rest addle and die, being beaten in the battle. If,

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carried out into material execution. It is the incarnation, the embodiment, the lasting register of physical influences, the daughter of the environment.

(y) If matter does not undergo evolutionary changes of new force or principle through certain laws, it must do so through a miraculous interference with the course of Nature.

If not, is life in its beginning other or more than a fact, and its appearance a phenomenon both to be accounted for by evolution in conjunction with matter and its inherent forces and principles?

"Given: First, the planet without life (so-called); afterwards, the planet with life.

therefore, the peculiarity is advantageous, it will be perpetuated; if unfavorable, it will be lost.

The law of variety of species, as regards color, &c., was well shown where Jacob resorted to the expedient of exposing whittled willows to the pregnant ewes in Laban's flock so as to obtain the speckled or striped ones for himself.

The causes of variety in plants and animals is, 1st, Growth with reproduction; 2nd, Variability from indirect and direct action of life and food; 3rd, From use and disuse, a ratio of increase so high as to lead to a struggle for life, and, as a consequence, to natural selection entailing divergence of character and extinction of less improved forms. Professor Asa Gray says, "Variations have been led along certain beneficial lines, as a stream is led along useful lines of irrigation."

Bacon ("Nat. Hist.," Cent. vi.), in speaking of changes * in plants, says—"518. This rule is certain, that plants, for want of culture, degenerate to be baser in the same kind; and sometimes so far as to change into another kind:—

1. The standing long and not being removed maketh them degenerate.

2. Drought, unless the earth, of itself, be moist, doth the like.

3. So doth removing into worse earth, or forbearing to compost the earth: as we see that water-mint turneth into field-mint, and the colewort into rape by neglect, &c."

"525. It is certain that in very sterile years corn sown will grow to another kind:—

'Grandia sæpe quibus mandavimus hordea sulcis,
Infelix lolium, et steriles dominantur avenæ.'

(*) "Observe the gradations which are found between the ranunculus aquatilis and the ranunculus hederaceous: the latter—a land plant—resembles those parts of the former which grow above the surface of the water, but not those that grow beneath it.—(DARWIN'S NOTES ON TRAPA NATANS 'BOTANIE GARDEN,' part ii, canto 4, l. 204).

And generally it is a rule that plants that are brought forth for culture, as corn, will sooner change into other species, than those that come of themselves; for that culture giveth but an adventitious nature, which is more easily put off."

Buffon writes as follows:—

"We see that there is no absolute and essential difference between animals and vegetables, but that Nature descends by subtle gradations from what we deem the most perfect animal to one which is less so, and again from this to the vegetable.

The freshwater polypus may perhaps be considered as the lowest animal, and as, at the same time, the highest plant." (Tom. ii. p. 9, 1749).

TEMPERATURE.[z]

"Assimilation in plants," says Pfeffer, "is only possible between a mean specific minimum and maximum of temperature; between these two extremes lies an optimum for the development of the species." This demonstrates that similar laws alike exist for

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(z) "Temperature of climate, quality of food, and the ills of slavery —here are the three main causes of the alteration and degeneration of animals. The consequences of each of these should be particularly considered, so that, by examining Nature as she is to-day, we may thus perceive what she was in her original condition."—(Buffon, tom. xiv, p. 317.)

plants as for animals—and that hybridisation is the general, not the exceptional, law for variation of species in plants.

The publication of Humboldt's "Essay on the Geography of Plants" (1805) "first formally drew the attention of botanists to the connection between the distribution of plants, and the distribution of heat on the surface of the Earth. As an advance is made from the Equator toward the pole in either hemisphere, the mean annual temperature declines, and in succession a series of vegetable zones is encountered, merging gradually into each other, though each, where best marked, is perfectly distinguished from its successor. In the tropics there are the palms which give so striking a characteristic to the landscape, the broad-leaved bananas, and great climbing plants throwing themselves from stem to stem like the rigging of a ship. Next follows a zone of evergreen woods, in which the orange and citron come to perfection. Beyond this, another of deciduous trees, the oak, the chestnut, and the fruit-trees of our orchards. Here the great climbers of the tropics are replaced by the hop and the ivy. Still farther is a belt of conifers, firs, larches, pines, and other needle-leaved trees; and these lead through a range of birches, becoming more and more shunted, to a region of mosses and saxifrages, but which at length has no tree nor shrub; and finally, as the perpetual polar ices are reached, the red-snow alga is the last trace of vegetable organization.

A similar series of facts had long previously been observed by Tournefort in an ascent of Mount Ararat. The distribution of vegetation from the base to the top of the mountain bears a general resemblance to the distribution from the base to the polar regions. These facts were generalized by subsequent observers.

It was established that there exists an analogy between horizontal distribution on the surface of the globe, and vertical distribution at different altitudes above the level of the sea. Even in the tropics, if a mountain be sufficiently high, a short ascent suffices to carry us from the characteristic endogenous growths at its foot through a zone of evergreens into one of deciduous trees, and this again into one of conifers, the vegetation declining through mosses and lichens as we reach the region of perpetual snow.

In these cases of horizontal and vertical distribution, which thus present such a striking botanical resemblance, there is likewise so clear a meteorological analogy that it is impossible to avoid the conclusion that the distribution of plants depends very largely on the distribution of heat. And, indeed, what better illustration of the influence of heat could we have than this, that by artificially adjusting the temperature of hot-houses we can cause any plant to grow in any latitude?

But temperature alone does not determine the distribution of plants. If it did, we should find the same species in the same isothermal zones. Throughout the old continent, with the exception of the torrid zone, heaths abound; but in America not a single heath occurs. In the New World, through forty degrees on each side of the Equator, the cactus tribe flourishes; in the Old not a single cactus is to be seen—the spurges there replace them. So, again, in Australia, the forests present a melancholy, a shadeless character, from their casuarinas, acacias, eucalypti; whereas, if temperature alone were concerned, they should offer the same aspect as the forests of North America and Europe.

As regards animals the same remark may be made. In the temperate zone, eastward beyond the

Caspian, there are men whose complexion is yellow; in Europe the complexion is white; the American Indian is red. Asia has its Tibet bear, Europe its brown bear, North America its black bear. The European stag finds in America its analogue in the wapiti, its Asiatic in the musk deer. The wild ox of Lithuania differs from the North American buffalo, and this, again, from the Mongolian yak. The llama* in America replaces the camel of Asia, the puma replaces the lion. Brazil has had, in times long past, representatives of its existing sloths and armadillos. Australia, which has isothermal zones like those of other continents, has no apes or monkeys, no cats or tigers, no wolves or bears, hyenas, horses, squirrels, rabbits; no woodpeckers or pheasants. Instead of them it has the kangaroo,[1] wombat, ornithorhynchus, cockatoos, and lories,—nowhere else found.

Then, though heat is a dominating influence in the distribution of plants and animals, it is by no means the only one. There are also other conditions, such as the supply of water, the composition of the soil, the access of light, etc. It has been found convenient to group all these together, and to speak of them, as I have already stated, under a single designation, "The Environment."

Change in the environment and change in organisms go hand-in-hand. Should the warmth of the tropics be diffused into the polar circle, a tropical vegetation would replace the vanishing snows. Should the ices of the poles spread over the temperate region, the reindeer would accompany their invading edge.

(*) The Llama in its wild state is supposed to have developed from the Guanaco.

(1) The young of the kangaroo twelve hours after birth are 1⅙ inches in length. It receives nourishment by milk being squeezed out of the teats by certain muscles.

While the environment thus influences the organism, the organism, reacting, influences the environment.

The most striking instance of this, perhaps, will be found on comparing the constitution of the atmosphere before and since the Carboniferous epoch. Prior to that epoch, all the myriads of tons of coaly substance now inclosed in the strata of the Earth existed as carbonic acid in the air. By the agency of the sunlight acting on the leaves of the luxuriant vegetation of those times, this noxious gas was gradually removed, and replaced by an equivalent volume of oxygen.

Anterior to the coal deposit, the fauna was cold-blooded and slow-respiring. The flora thus changed the aërial environment, and this, in its turn, reacting, changed the fauna.

It is on all sides admitted that plants tend, by their removal of carbonic acid from the air, and replacing it by oxygen, to compensate for the disturbance occasioned by animals. In this way, through very many centuries, the same percentage constitution of the atmosphere is maintained, the sum-total of vegetable being automatically adjusted to the sum-total of animal life—automatically, and not by any interference of Providence,—a fact of great value in its connection with the theory of Evolution. For, if we admit what has been conclusively established by direct experiment, that plants would grow more luxuriantly in an atmosphere somewhat richer in carbonic acid than the existing one, we may see how upon this condition depends a principle of conservation, which must forever retain the air at its present constitution, no matter how animal life may vary."—(Dr. Draper's Lectures).

VARIATION IN PLANTS.

As I have referred to plants in another part of my works, &c., I shall now only point out a few of the most interesting changes and variations which occur in them, showing that variation of species is not restricted to animals, but is shared in equally alike with the vegetable kingdom.

Amongst flowers we find the cowslip, primrose, oxslip, and polyanthus, are all producible from one seed, whilst the artichoke degenerates into a Cardoon. Again algæ, according to M. Fries, the Swedish botanist, when exposed to the air, contract and become lichens. Thus *nostoc muscorum* becomes *collina limosum.*

In Sicily and the South of Europe there grows a wild grass known to botanists by the name of *Ægliops ovata*; this plant has a tendency to assume another form, under which it is called *Ægliops tricoides*. M. Faber selected seeds from the latter form; in 1839 he sowed them, and found among the plants a disposition to still farther transformation, and such as exhibited this tendency he again selected, sowing in the following year the seeds they produced. He continued this mode of sowing and selecting for several years, and every year found the produce assuming a closer resemblance to the cultivated wheat, till the twelfth season of his labors, when, to his satisfaction, he obtained the form of the plant which is now regarded, in temperate climates, as yielding "the staff of life;" which said plant, or wheat, has been found embalmed in Egyptian mummies 4,000 years ago, and still, if sown, is productive.

The *Brassica oleracea*, or sea-cabbage, from 12 to 24 inches high, having glaucous, waved, lobed, and smooth leaves, bearing large flowers of a pale yellow, and growing on the chalky cliffs of the English coast, can be cultivated, so as, from its original weight of a few ounces, to become 30lbs.: it becomes our English drum-head. In its wild state the stem is slender and leaves small—by cultivation the stem becomes thick and fleshy, and leaves succulent.

The sea-kale (*Crambe maritimi*) by proper care and cultivation becomes the delicate sea-kale of our garden. In its natural state it flourishes on the south coast of England, and on various parts of the Irish coast.

The Acotyledons are verified as Cryptogams and their relation to the Phænogams is clearly pronounced.

The Cryptogams are separated into two essentially different classes, in which gradation is likewise distinctly pronounced (cellular and vascular Cryptogams, Thallophytes, and Kormophytes); between the perfect Phænogams and the Cryptogams an intermediate grade has been shown, the Gynosperms. But most important of all is the circumstance that the four chief grades ascertained in the vegetable kingdom accurately correspond with the grades of development occuring in the individuals of all the higher plants;—the germ, the vegetative stem, the blossom, and the fruit." The cell furnished with a nucleus and sheath is inseparable from the protoplasmic corpuscle devoid of nucleus or sheath, on the growth and fission of which rests the reproduction of the lowest living beings. Their origin from inorganic matter is a postulate of sound human understanding.

"No faunas are more in contrast than those of Cape Horn, the Cape of Good Hope, and New Holland. Hence other influences must be in operation besides those of climate;—influences of a higher order, which are involved in a general plan, and intimately associated with the development of life on the surface of the Earth." (Agassiz and Gould's Comparat. Physiology, p. 365.)

The above examples are quite sufficient to convince any unprejudiced person of the great evolution going on in the vegetable kingdom. We have also sufficient evidence to show similar evolutionary powers exist, and are going on in the animal kingdom.

CONNECTING LINKS.

The connecting link, as generally called, between races, &c., is only arbitrary, as made by Zoologists—what is considered a link by one, in one way, is not so in another. Links exist variously by analogy of organs, or similarity of certain parts, such as lungs, heart, blood, features, feathers, scales, and habits, &c., whilst in other parts there is the greatest dissimilarity.

Agassiz, as a zoologist, and simply on zoological grounds, assumed that there are several zones between the Ganges and the Atlantic Ocean, each having its own flora and fauna, and inhabited by races of men, the same in kind, but of different origin: when told by philologists that it is impossible, because the language spoken through that wide region demonstrated that all the inhabitants had a common descent, he answered, that "as ducks quack everywhere, he could not see why men should not everywhere speak or have an affinity of the same language.

Why the connecting links have not in certain cases been found, is, because the world has not been sufficiently searched.

However, in future ages, we may yet find the links in the hills of the ocean, when the sea again gives up her bed, and takes possession of our now fertile land, as she has done of yore.

Earthquakes and the majestic power of the ocean have swallowed up millions of people, yet no one has ever yet found the bones of man in the bowels of the Earth or Sea, for the simple fact that the strata has not been sufficiently searched. It is only by a fortunate combination of circumstances that any particular deposit could give us a fair conception of what life was that existed upon the Earth when that deposit was formed.[a] The time will, however, come before long when it shall be thought "wonderful

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(a) In after years, when the standpoint of mysticism is past, man will be viewed as a genus springing up from an animal condition by means of the origin and unfolding of his idiosyncracy. That he sprung from a primitive condition history plainly shows. The rude state in which the ancient Britons, Celts, and Gauls were found nineteen centuries ago is well depicted, even by Cæsar and St. Jerome (vide Cæsar Comment de Bell. Gall. and St. Jerome's Works).

If we take the theological or Judaic source, it is stated that man, 6,000 years ago, was hairy, went naked. afterwards covered himself with leaves and skins, subsisting on fruits and flocks, sheltering in caves and tents, prone to disobedience, guilty of fratricide, polygamy, and in no way differing in condition, physically or mentally, from the rudest and most barbarous races of the present day.

that naturalists, who were so well acquainted with the comparative structure and development of man and other animals, should have believed each to have been a separate act of creation," or, that no links have ever united man and inferior animals. A sudden transition, without a connecting link in the great animal chain, from irrational to rational creatures, is a distinct phenomenon from that passage from a simple to a more perfect animal organization and instinct. To pretend that such a step, or rather leap, can be a part of a regular series of changes in the animal world is to strain analogy beyond all reasonable bounds.

Individuals belonging to one species, separate, and living in different climates, influenced by food, &c., gradually change their form, appearance, and constitution, &c., and at length cannot be known as belongto original species.

It appears plain to us that there has been a constant oscillation in numbers of species in each genus in the tertiary as compared with the modern epoch. The continual progress that is slowly but surely going on shows an increasing similarity of living fauna—and amongst vertebrates especially—in their increasing resemblance to man from the first appearance of the primary palæozoic fishes.

LINKS IN THE ANIMAL KINGDOM.

The Swatherium is a connecting link between Ruminants and Pachyderms.

The *Mastodon* [b] and *Megatherium,* when examined microscopically, are modelled after the type which we see in our domestic quadrupeds, and in man himself.

The gigantic pachyderms of Australia were between the Mastodon and Dinotherium.

The pachydermata families played an important part in the tertiary period. The extinct genera affords important links for uniting in a natural series the several groups of which it is composed.

The Ursine Opossum, or Australian Devil, has great analogy to Carnivora and other classes.

The Anoplotherium had affinities with the Rhinoceros, Horse, Hog, Hippopotamus, and Camel. It had 44 teeth, of which 6 incisors, 4 canine, and 14 molars, formed a continuous line uninterrupted by that space between canine and molars which is seen, more or less, in every other animal, man and monkey excepted.

(b) "The discovery of a mastodon skeleton near Freehold, N. J., adds to the evidence that some of those huge creatures must have survived until a period geologically quite recent. The bones were found by a farmer while digging a trench for draining a swampy meadow, and examined by Dr. Samuel Lockwood. The tusks were nearly eight feet long, but too much decayed to be preserved. The bones of the head, which were lying within two feet of the surface, were so soft as to be easily cut with a spade. They were nearly the color of the black vegetable mould of the meadow, and therefore almost indistinguishable. But careful inspection showed that the front part of the head was greatly similar to that of the elephant of the present day, except that the forehead was abnormally high. By a close investigation of the skull, numerous air-cells, some of them an inch in diameter, were

It was between the Ruminantia and Pachydermata Classes that Cuvier imagined the Anoplotherium, in a great many respects, is an intermediate between Pigs and Ruminants. Its head partook of the form of that of the Horse and Camel, and did not possess a prolonged snout.

The Leptotherium is a fossil form of the S. Amer, Ruminant.

The Palæotherium connects together animals such as the Rhinoceros,* Horse, and Tapir.

The Lophiodon (fossil) differs from the Palæotherium in having six molars on each side of both jaws: fifteen species of this genus have been found.

Between the Tapir and Rhinoceros we have the Daman or Hyrax. In skeleton form it may be said to be a miniature Rhinoceros.

The gradations of change are well seen in the extinct terrestrial reptiles, such as the Ornithoscelida, Plethyosaura, Ichthyosaura, Megylosaura, and Plesyosaura.

The Phascolarctor, or Koala, called by the colonists of Australia the native bear, or monkey, is entirely

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found. The bone of the skull was of an immense thickness, but completely honeycombed with these air-cells. These cells had become filled with the fibrous roots of plants, which extended through the entire skull. After digging through the skull and coming to the lower part of the head, three or four more teeth, similar in shape, size, and weight to that already described, were found. The teeth, unlike the tusks and bones, were in a remarkably good state of preservation. The exploration was continued until the entire body was laid bare. Beneath the bones was found a bed of sand, upon which the animal had evidently laid down to die. The bones of the body, though greatly decomposed, were plainly distinguishable, and the position of the animal was ascertained. It was lying with its head to the north-east, and its legs stretched out at length at right angles to its body, and its head inclined towards its chest.

The region about Freehold is believed by geologists to have been recently raised above the surface of the ocean.

(*) The Rhinoceros of Sumatra has two horns.

destitute of tail. The fore-feet have each five toes, of which two are opposed to the other three—a solitary instance among Mammalia. The Phascolomyidæ (Wombats) are evidently representatives of Rodentia; they are clothed with a brown woolly hair. The præmolar and molars agree with the incisors in growing from permanent pulps, in which respect the Wombat differs from all other Marsupials, and agrees with the herbivorous Rodents, and with those Edentata which have teeth, and with the extinct *Toxodon*.—(Owen).

The Ornithorhynchus, a semi-rodent, called the colonial water-mole, has the body of an otter and bill of a duck—this draws together Mammals, Birds, and Reptiles,—has no true teeth—capacious cheek, pouches—five toes with web between them, which it can withdraw at pleasure—feet are directed backwards, so as to allow it to swim as a seal. The foot of the male has a spur like a cock—it catches food in the mud, but, when that is scarce, eats water-weeds—habitation generally in river banks. The *Ornithorhynchus* and *Echidna* "may safely be considered as relics of a much larger group," have bill and web-feet of swimming birds—former being a semi-rodent, the latter being a semi-insectivora: both of these animals, from the peculiar structure of their reproductive organs, show their near approach to the Class *Aves*. The Ornithorhynchus has brain (*vix gyris sulcisque excepto in cerebello, notatum*).

The Virginian Opossum represents Quadrumana among Ovo-viviparous Mammalia. It is born blind, shapeless, and naked, and found adhering to the teat of its mother, and remains so till about the 50th day, when it is found to have acquired to the size of a mouse.

With the Kangaroo of Australia, the young are carried about in the mother's pouch[c] till the 80th day.

Bats and Plerosauria, or Pterodactyles, are intermediate links between animals and birds: between birds, bats, and lizards there is only one genus, the Pterodactylus; from the length of its neck and form of the head, which resembles a bird, whilst its anterior extremities were at once feet and wings, this animal was fitted for arboreal life in the forests. It led the life of a bat and swallow when no birds or bats existed. The difference in form from other birds arises from circumstances, habits, and modification required to keep up a complete and harmonious link in creation's scheme.

The *Hesperornis Regalis,* a swimming and diving bird, 5 or 6 feet long, was provided with long jaws armed with teeth with curved crowns and thick roots,

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(c) The Tiger Cat of Victoria is a marsupial, but carries its young for a much shorter time than even the Opossum or Kangaroo.

The mammary gland of the kangaroo is acted on by a peculiar muscle which presses the fluid from it into the mouth of the young animal.

(d) The Ornithorhynchus paradoxus draws together mammals birds, and reptiles.

(e) The Macropodidæ, long-footed kangaroo tribe, from form of teeth and conformation of stomach, remind us of Ruminantia.

When twelve hours old they are 1 and one-sixth inches long.

The Peramelidæ or Bandicot tribe approach Opossums—have six incisors in lower jaws, muscles elongated, narrow, and pointed—has insectivora jaws.

Reptiles are closely connected with two extinct forms, viz., Ichthyosaurus, and the Plesiosaurus.

We have certain species of fish which remind us of the Crocodiles› the swimming-bladder somewhat resembling a lung, and the vertebral column and ribs possessing many characters in which they approach those of that order of reptiles.

In the eel we have the form of the serpent so exactly repeated that it is not easy to distinguish the group to which certain species belong.

not set in distinct sockets, but lodged in a groove. This bird diminishes the hiatus between reptiles and birds. There is again the *Ichthyornis dispar*, a bird with teeth, but in distinct sockets, and only rudimentary wings. Its vertebræ have not the peculiar characters of existing birds. Again the Archapteryx, which, to a certain extent, occupies a midway place between a bird and a reptile;[d] but the gradation is best seen in the extinct terrestrial reptile,[e] the Ornithoscœlida.

The different orders of reptiles, although distinct as to types, viz., turtles, lizards, serpents, and frogs, are yet very closely connected together by links of transition that pass between the typical forms.

Thus between turtles and crocodiles—a species of turtle having a long neck, tail, and legs, and a small shell which only covers a part of the back (alligator-tortois),—a transition passage is established. The crocodiles and lizards lead us by easy transition to lizards. From four-legged lizards we pass to serpents, the passage being made by a species of lizard chalcis.

VARIABILITY OF SPECIES.

One of the plans of Nature in causing variability of species has not been sufficiently dwelt upon by recent writers, viz., *Hybridisation,* or the fertile union of two individuals which are supposed to belong to two different species, and which, according to some writers, were never intended to be capable of actual sexual union. They always stoutly maintained that even if hybrids could be born, the offspring must inevitably prove barren—and, if successful, these, considered distinct species, were only a simple variety of the same species.

The above assertions are directly negatived by so many increasing proofs of hybridisation in the London and other Zoological Gardens.

Hybrids are well known to all of us amongst the most distinct and widely dissimilar classes of the animal kingdom.

Among apes, *e.g., Cynocephalus mormon and Macacus cynomolgus,* crossing has produced young; the hybrid race of *Leporidæ,* a cross between a rabbit and hare, is well known; the tiger breeds with the lion, the leopard with the jaguar, the polar with the brown bear, the masked with the Berkshire pig, *Dama vulgaris* with *Dama mesopotamica, Equus Burchelii* with *Equus Communis, Equus Onager* with *Equus* *hemippus, Asinus Communis* with *Equus hemionus.* All the above-mentioned crosses have repeatedly given birth to offspring. A hybrid snake between *Chilobothrus inornatus* and *Epicrates angulifer* is seen in the London Gardens. With ducks we have crosses such as *Ana sponsa* with *Fulicula ferina* and *myrocca, Anas boschas* with *Anas crecca;* among fishes are frequently seen Hybrids *Salmo salvelinus* and *Salmos fario, Cydrinus carpio* and *Cyprinus carassius.*

In insects a cross has been made between the larger and smaller peacock-moths and the willow and poplar hawk-moths. (*Vide* Claus Lehrbuch der Zoologie, 4th Edit.)

The following list of Hybridisation is furnished by Dr. Noll, of Frankfurt:—

In Carnivora:

Polecat and ferret.
Wildcat and domestic cat.
African leopard and black panther of Java.

In Ruminants.

Yak and common cow (at Halle).
Bison and black cattle.
Ovis musimon and *Ovis Cycloceros.*
Cervus virginianus and *C. Macrotis* (in Cincinnati).
Lima sheep (in Chili), a cross between the sheep and goat—(somewhat doubtful).
Cervus minor, a cross between the Axis and the Hog-deer.

Pachydermata—(With solid hoofs).

Equus toeniopus, M., and *Equus zebra*, Fem. (at Berlin.)
Horse, M., and Burchell's zebra, F.
Ass, M., and Burchell's zebra, F.
Sus scrofa persica and *Sus scrofa.*
Sondaica (at Rotterdam).

Rodents.

Lepus variabilis and *Lepus timidus* (in a free state).

Birds.

Modena pigeon, M., and turtle-dove, Fem.
Phasianus versicolor and gold pheasant (at Antwerp).
Gold pheasant and *Thaumalia Amherstiæ* (at Paris).
The common fowl and duck.
Anas superciliosa and *Aix sponsa*.
Greenfinch and Goldfinch.

Insects.

Phigalia pilosaria, M., and *Nysia hispidaria*, Fem. (as described by Midford).—*Vide* Packard's Guide to the Study of Insects, p. 54.

The above statements suffice to show us that two different species can unite and become fertile.

The *Leporidæ* are well known to be fertile, and produce cross-breeds with both the hare and rabbit. Hybrids between the dog and jackal, or between the dog and wolf, remain fertile for many generations; those of *Phasianus colchicus* and *torquatus* are perfectly fertile, so also the hybrid geese, and those between *Cervus vaginalis* and *Cervus Reevesii.*

Pallas once saw a tame hare and dog copulate. (Spic. Zool. fasc XI, p. 36).

The bull and mare, under artificial restraint and privation, have copulated without fecundation. (Buffon, vol. IV, p. 221).

A female mule in the Jardin d'Acclimatation, Paris, produced two foals to a horse, and two to an ass. In the London Gardens a hybrid female of *Bos indicus* had young by a male *Bos frontalis.* Newton states that a hybrid female between the common duck and *Anas boschas* proved fertile with a male *Mareca penelope*

Felis torquata, described by Cuvier as a distinct species, is a hybrid produced in a free state between the domestic cat and *Felis bengalensis*; *Anas bima-*

culata is a hybrid between *Anas boschas* and *Anas crecca*; *Tetrao medius* between *T. urogallus* and *T. tetrix*.

Siebold (on fresh-water fishes of Germany) thinks the vast number of intermediate forms, which constitute the *crux* of the zoologist who tries to determine the various species of fresh-water fish in Germany, must have originated from Nature's crossing. He enumerates eight hybrids, which have been described by other zoologists as types of special genera.

Von Lœwis asserts that *Lepus timidus* and *Lepus variabilis* frequently produce hybrids; and Dr. W. Wurm states that he has often seen cross-bred partridges.

Dr. J. von Fischer, Director of the Zoological Gardens at Cologne, asserts that the polecat and ferret are different species, and produce hybrids in a free state.

Mr. Buxton shows that a male white cockatoo and a female rose-colored Leadbeater's cockatoo, when released from confinement, although formerly barren, bred two years in succession.

G. Koch reports the union of *Zygæna peucedani* with *Zygæna trifolii*, of *Zygæna minos* with *Zygæna loniceræ*, and of *Smerinthus populi* with *Smerinthus ocellata*.

A. Meyer detected the union of various species of Phryganidœ; Peragallo that of *Strangalia melanura* with *Leptura livida*; Gerstæcker that of *Tipula oleracea* with *Pachyrhina scalaris*.

Heynemann states that *Lymnœa stagnalis* and *Lymnœa auricularis* have bred together.

When we turn our attention to fowls, we have the five-toed (*Galus pentadactylus*), then the rumpless fowl of America (*Gallus ecaudatus*). Then again there are fowls of every size, feather, and color, such as Spanish fowl, English, French, and Bramapootra, all of which are entirely different breeds.

There is a peculiar breed of sheep (*Ancon*), bred by Mr. Wright, of Massachusetts, in 1791, called the Otter breed, which can neither run nor jump.

Sometimes in mixing breeds there are found two lambs, short and long-legged, sucking the mother.

The Iceland breed of sheep have three, four, and even five horns (*ovis polycerata*).

When I view all these cases, and find, with many in a free state, hybridisation is carried on, although not always fruitful, and taking into consideration characters occur, in fruitful issue, which positively belong to neither parent, I must confess that hybridisation plays not a mongrel, but an essential part in selection and variation of species.

Again from facts which are ever before us I can deduce a general principle, viz., that the more remote the zoological affinity of two animals is which unite to produce young, the greater the probability will be that new characters and instincts will arise entirely distinct from those of either parent. And further, that sexual union is in itself an auxiliary in producing variation of species; and although hybridisation does much in variation, yet when left to Nature, it is worked out with far less violence.

Sachs ("Text-book of Botany") expressly asserts that there is no "essential difference between self-fertilisation of pure species or varieties and fertilisation by other species or varieties, and that in the case of true hybridisation many peculiar characters attributable to sexual differentiation and agreement are brought into greater prominence." From all that we know at present, the interruption of the constancy of specific characters may be regarded as one of the most conspicuous of these peculiarities.

In conclusion, I may say that it has been shown that the strongest marks and differences in animals are those where man instead of Nature regulates the sexual intercourse. Especially so with the dog, which is so perfectly devoted to us, and has sacrificed to us its individual character, interest, and feelings.

"Carried by man all over the world, subjected to the action of the most powerful causes, and directed in sexual intercourse by the will of their master, the dogs vary in colour; in the quantity of hair, which is sometimes entirely lost; in their nature and properties; in size, which may differ as one to five in linear dimensions, or more than one to a hundred in the mass; in the form of the ears, nose, tail; in the height of the limbs; in the development of the brain, and consequent form of the head, which may be slender, with elongated muzzle and flat forehead, or short, with convex forehead; so that the apparent differences between a mastiff and a spaniel, a greyhound and a poodle, are greater than we find between any wild species of the same natural genus. Lastly, which is the maximum of variation hitherto known in the animal kingdom, there are races of dogs with an additional toe and corresponding metatarsal bone on the hind-foot, as there are six-fingered families in the human species. Still, in all these variations, the relations of the bones remain the same, and the form of the teeth is never altered."—(Cuvier, *Recherches sur les Ossemens fossiles;* i. *Disc. prelim.* p. 78).

Pallas seems fully convinced that the jackal, "copiosissimum in universo oriente animal," is the source of our dogs, which he closely resembles in manner and disposition, being also very like some breeds in size and figure. "Homini facillime adsuescit, nunquam, uti lupus et vulpes cicurati, infidi animi signa edens, lususve cruentans; canes non fugit, sed ardenter appetit, cum iisque colludit, ut plane nullum sit dubium cum iisdem generaturum, si tentetur experimentum. Vocem desiderii caninæ simillimam habet; homini cauda eodem modo abblanditur, et in dorsum provolvi atque manibus demulceri amat. Ipse quoque ululatus ejus, cum latratu canum ejulabundo magnam habet analogiam. Ergo dubium vix esse puto, hominis speciem, in eadem cum lupo aureo climate naturaliter inquilinam, antiquitus hujus catulis cicuratis domesticos sibi educasse canes, quorum naturalis instinctus jam homini, quem feri non multum timent, amicus, et in venationem pronus erat."—(*Spicil. Zool.* fasc. xi. p. 1, note).

These opinions are confirmed by the statements of Guldenstædt, who found the cæcum and the teeth perfectly alike in the dog and jackal; it is not so in the wolf. The jackal makes water sideways; "odorat anum alterius; cohæret copula junctus."—(*Nov. Comment. Petrop.* v. 20, p. 459, tab. xi).

The different breeds of dogs, for example, are referred by some to different species; and they are, indeed, sufficiently marked by distinctive permanent characters to warrant the opinion, if the constancy of such characters were a sufficient proof of difference in species. Others, again, refer them all to the shepherd's dog; and others include all the dogs, the wolf, fox, and jackal, in one species. The dog and bitch produce with the male and female wolf, and with the dog and bitch fox; and the offspring is prolific.[f] Yet we cannot surely ascribe animals, which are marked in

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(f) "For mine owne opinion I find no difference but only in magnitude between the cat of Europe, and the Ounce of India; and even those dogges which are become wild in Hispagniola, with which the Spaniards used to devour the naked Indians, are now changed to Wolves, and begin to destroy the breed of their cattell, and doe often times teare asunder their own children."

their wild state by such strong characters of bodily formation, disposition, and habits—as the wolf, fox, and jackal,—to one and the same species without overturning all the fundamental principles of zoology, however freely they may intermix, and however perfect the reproductive power may be in their offspring.

CHANGED CONDITIONS IN ANIMALS.

Man,[g] as well as animals and plants, is influenced by his surroundings, food, habits, and social arrangements. For example, contrast hardy mountaineers with lowlanders, mechanical cities with agricultural districts, aboriginals of the frigid, temperate, and torrid zones, the gigantic trees of California with the two-inch willows, lichens, &c., of the frigid zone.

The common crow and rooke of India are full of red feathers in the droun'd and low islands of Caribana, and the blackbird and thrush hath his feathers mixt with black and carnation in the north parts of Virginia. The Dog-fish of England is the Sharke of the South Ocean. For if colour or magnitude made a difference of species, then were the Negroes, which wee call the Blacke-Mores, non animalia rationalia, not men but some kind of strange Beasts, and so the giants of the South America should be of another kind than the people of this part of the World. We also see it dayly that the natures of fruits are changed by transplantation." (Sir W. Raleigh, "History of the World," bk. i, ch. vii, §9. "Athenæum," March 27, 1875).

"What! says Coleridge, in a note to Stillingfleet, "Did Sir W. Raleigh believe that a male and female ounce (and if so why not two tigers and lions, &c.?) would have produced in course of generations a cat, or a cat a lion? This is Darwinising with a vengeance."—See "Athenæum," March 27, 1875, p. 423.

(g) Man deviated from the ape (Catarhine stock) probably as remote as the Eocene period, for it is seen that the higher apes had

The change in the color of the hare in the cold regions, the chameleon, the tree-frog, as well as moths and various insects and vermin, all depend on habit, food, the environments, and climate.

If we change the mode of life of any single animal, the change will instantly have an influence on all the other animals whose healthy existence was in any way dependent on its normal function before it was altered.

The life of an animal depends not merely on the influence of the external conditions, but on the reaction of its own reorganisation.

Every change in the conditions of animal existence influences different animals in different ways.

Darwin says that "neither migration nor isolation in themselves can do anything. These principles, as regards eternal conditions of existence, come into play only by bringing organisms into new relations with each other, and in a lesser degree with the surrounding physical conditions."

Though new conditions of existence do sometimes definitely affect organic beings, "it may be doubted [h] whether well marked races have often been produced by the direct action of changed conditions without the

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diverged from the lower apes as early as the Upper Miocene period (as seen by the existence of the Dryopithecus.)

We have good proof of man's existence in the Tertiary period.

The gyral type of the human brain is, as a whole, but a higher development of that of the ape: be this taken in the sense of the Evolution theory, or merely in its old-fashioned signification, remains, for all this, a reality.

The anthromorphous ape will be exterminated some of these days: the break between man and his allies will then be wider. It will intervene between the Caucasus and some ape as low as the baboon instead of between the negro and Australian and the gorilla.

(h) Dr. Chambers truly said that every remaining semblance of irregularity in the Universe is due not to the fickleness of Nature, but to the ignorance of Man,—that her most hidden movements are aid of selection either by man or Nature."—(DARWIN. "Animals under Domestication," ch. xxiii).

Again, "such changes are manifestly due not to any one pair, but to all the individuals having been subjected to the same conditions, aided, perhaps, by the principle of reversion."—("Descent of Man," i, 236).

"There can, however, be no doubt that changed conditions induce an almost indefinite amount of fluctuating variability, by which the whole organisation is rendered in some degree plastic."—(*Ibid.*, i. p. 113).

Finally, "the prevention of free-crossing and intentional matching of individual animals are the cornerstones of the breeders' art."—("Animals under Domestication," ch. xv.)

Hæckel allows of no doubt that all those characters, collectively, of a species or of a genus, which present themselves to us as identical, can only and unconditionally, as being identical, have originated from some one parent-stock.

The wild Bull (*Bos primigenuis*), is the origin of our domestic cattle, according to Rutimeyer, Cuvier, and Bell; but Owen dissents.

In 1820 Dr. Körte gave a description of a primæval bull found in the neighbourhood of Halberstadt, and

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conducted with an uniformity as rigorous as fate, that even the fitful agitations of the weather have their law and their principle, and that every tremulous vibration of the air, every drop of water, and the fall of the snow-flake, have a law to govern them which is as absolute, though intricate to our limited knowledge, as

"The very law which moulds a tear,
And bids it trickle from its source,"

"Which preserves the Earth a sphere,
And guides it onward in it's course."

The more we become acquainted with Nature's laws, the more we are led to recognise her immutability, and view her as a mighty, though complicated, machine, all whose results are sure, and workings without a shadow of turning or variableness.—N.C.

instituted comparisions and reflections how, under the influence of domestication, our highly-modified cattle had been evolved from the former. This relic, and another in Thuringia (1821), which later specimen was obtained by him for the Museum at Jena, gave Goethe an opportunity of coinciding with Körte, and of illustrating, by an actual incident, the possibility of this doubtless easy transformation.

The horse again has, doubtless, undergone considerable changes, for in the older Pliocene strata we find the Hipparion its protogen.

Foals are occasionally born with supernumerary toes. This monstrosity can be only explained by reversion to the three-toed historical ancestor of the present genus. Horses are sometimes found with splint bones, making four in number.

The weight of the evidence depends on the apparently wide distinction between the feet of a horse (or of any other member of the equine family) and the five-toed feet of so many other animals. It should, in passing, be noticed that what is commonly called the foot of a horse is but a part of the real foot, making comparison with the hand or foot of a man. The fore foot corresponds, in fact, with the middle finger only of the hand of a man, the hind foot corresponding with the middle toe of a man's foot. The other digits are present only in rudimentary form. What corresponds to the wrist of a man is what is often called the knee of the horse; and what corresponds to the heel of a man is the joint called the hock. What is commonly called the ankle-joint, just below the pastern, does not correspond, in comparative anatomy, with the human ankle or wrist, but with the third joint of the middle toe or middle finger). So much understood, we perceive how, either from the study of exceptional cases among living horses or from the study of fossil horses, differing more and more, as we pass to older and older strata, from the present horse, we can learn something of the nature of the horse's descent or ascent to his present position in the animal creation, precisely as we might learn something of the origin of—let us say—tumbler pigeons, supposing we knew nothing about it in the first instance, by examining cases in which birds of this breed are imperfect as tumblers, presenting more or less marked features of resemblance to rock pigeons; or by tracing down the line of descent from rock pigeons to tumblers by means of preserved specimens, or collection of skeletons, plumage, &c., of many of the more or less remote ancestors of the tumbler pigeon. Darwin has, in fact, shown how much light such cases of comparatively rapid change in domestic animals may throw on the general theory of development. Other naturalists have done the like for the horse, whose development has been accomplished by natural selection instead of artificial selection, and this has been the work of unnumbered ages instead of being completed in a few years.

Professor Marsh a few years ago found various fossils, which aided him in forming a series of links illustrating the natural descent of the horse.

He has now completed this series, all but the actual five-toed ancestor, which has not yet been detected. We have first of all the present horse, ass, zebra, and quagga, normally having one-toed feet, running in fact as a man might run (or might more probably fail to run if he tried) on a finger of each fore limb and a toe of each hind limb. But occasionally we find among the present horses instances of reversion as respects the toes. The most usual form of what geologists (with that pleasing fondness for long words which seems to delight many students of science) call polydactolism, in living horses, is the presence of an extra small toe and toe-nail (that is a hoof) on the inside of the fore feet, and sometimes of all four feet (never, it would seem, of the hind feet only). But Professor Marsh has heard of a colt with three toes on one fore foot and two on the other; also of a mare (still living) which has three toes on each fore foot and a small extra digit on each hind foot, that is, the two lateral metacarpals had no digits. We might expect to find extra toes oftener on the fore foot; but it is rather curious that the extra toe, when there is one only, is always on the inside, for in general the second digit (the forefinger corresponding to this inside toe next the middle toe or finger) is less persistent than the fourth, and when developed an inside toe would seem to be in the way. Huxley, also, has noted several cases in which living horses present features indicating their descent from ancestors rejoicing in a greater number of toes. Next, going backwards in time, we find an animal to which Marsh gives the name *Pliohippus* (the horse of the Pliocene period) which was a near ally of the present horse, and had only one toe to each foot.[i] In a more remote era, the earlier Pliocene, we find a horse, no larger than a donkey, which ran on three-toed feet. To it Marsh has given the name *Protohippus,* or first horse. But it is by no means the earliest in the line of descent. We go back to the Pliocene, and find in its highest and latest formation the animal called the *Miohippus,* or horse of the Miocene, which had three working toes on each fore foot and a splint of a fourth, but this last reduced to a mere remnant. At a lower level, near the base of the Miocene, we find the *Mesohippus,* with three working toes on fore feet and hind feet, and splints of a fourth toe on each fore foot. The *Mesohippus* was not much larger than a sheep. We pass yet further back into

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(i) Huxley thinks it took millions of years for our present horses' development.

the remote depths of time, and find equine representatives richer and yet richer in digital development. The *Epihippus*, at the top of the Eocene, and the *Orohippus* in the middle of that formation, had four toes in front and three behind. It was not much larger than a fox. The *Eohippus*, at the base of the Eocene, had four well developed toes, and the splint of a fifth in front, and three behind. Doubtless one of these days geologists will find the fossil remains of the real original horse, which must have had five toes on each foot, and if the size of the animal has constantly progressed in one direction, as has the progressive development of its pedal extremities, then it would seem not unlikely that the original ancestor of the horse may have been no larger than the common domestic cat. Doubtless if we could see such a creature as it really was in life beside one of Barclay's dray-horses, it would seem at first sight impossible to believe that there could be any relationship between animals so unlike in size, and probably in shape, colour, and temper. But this is not more wonderful than the co-existence in one and the same era of animals so unlike in size, shape, colour, and temper as the tiniest of pet dogs and the mastiff or the Newfoundland dog, of the kinship of which, unlike though they are, no question can reasonably be entertained.

Huxley says, that in Post-pliocene times, there lived the "Hippotherium," in which the two splint bones were terminated by digits, but which were too short to reach the ground and take any part in bearing the weight of the animal. Going still back into the Tertiary age, he found remains of the Anchitherium, which resembled the horse in many features, but in which subsidiary, second, and fourth toes, though still smaller than principal central ones, were yet capable of reaching the ground. Thus the *Anchitherium* developed *Hipparion*, and thence our horse." [Huxley.]

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